VOL. XI, NO. 1 JULY, 1941

PROCEEDINGS

OF THE

HAWAIIAN ENTOMOLOGICAL SOCIETY

FOR THE YEAR 1940

HONOLULU, HAWAII

PRICE $2.00

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1940

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Chock, Q. C.
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Ehrhorn, E. M.
Fullaway, D. T.
Goolsby, W. C.
Hadden, F. C.
Harper, Bernice
Hilts, H. C.
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Schmidt, Carl T.
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Swezey, O. H.
[1]Timberlake, P. H.
Tinker, Spencer
[1]Usinger, R. L.
Van Zwaluwenburg, R. H.
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Whitney, L. A.
Williams, F. X.
Zimmerman, E. C.

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VOL. XI, No. 1 FOR THE YEAR 1940 JULY, 1941

JANUARY 4, 1940

The 409th meeting was held at the H.S.P.A. Experiment Station, January 4, 1940, at 2:30 p.m.

Members present: Miss Ethel Lucas, Messrs. Bianchi, Browne, Ehrhorn, Illingworth, Look, McBride, Pemberton, Rosa, Sakimura, Swezey, Van Zwaluwenburg, Williams and Zimmerman.

Vice-President Zimmerman in the chair.

The minutes of the preceding meeting were read and approved.

Mr. O. H. Swezey proposed Mr. R. G. Oakley for membership in the Society.

Mr. C. E. Pemberton reported that he had audited and found correct the financial report of the treasurer for the year ending December 6, 1939.

In view of the inconvenience to some members of Thursday for the monthly meetings of the Hawaiian Entomological Society, the Secretary-treasurer was appointed to find out what day would be more suitable for these meetings.

PAPER PRESENTED

On behalf of Dr. R. L. Usinger, Mr. O. H. Swezey presented by title a paper entitled "The genus Oechalia (Hemiptera: Pentatomidae)".

NOTES AND EXHIBITIONS

Mr. E. M. Ehrhorn described how a large specimen of the land planarian, *Bipalium kewense,* overcame and engulfed an active earthworm, hardly a vestige of the latter remaining.

On behalf of Dr. F. G. Holdaway, Miss Ethel Lucas exhibited a copy of the Indian Journal of Entomology, a new publication.

Dettopsomyia formosa Lamb.—Mr. Zimmerman reported the capture of a specimen of this drosophilid fly at light in Kaimuki in December. The species was first found in Honolulu by Dr. Williams in 1936. Malloch redescribed the species and recorded it from the Territory for the first time in these "Proceedings", vol. 10, no. 1, p. 54, 1938.

Elimaea punctifera (Walker).—Mr. Swezey reported a 71% parasitism of eggs of this large green grasshopper. Mr. Ehrhorn had brought in 7 of the eggs in one leaf found in his garden October 15, Manoa Valley. *Ufens elimaeae* Timb. issued from 3 of the eggs; and *Anastatus koebelei* Ashm. issued from 2 eggs.

Signiphora aspidioti Ashm.—Mr. Swezey exhibited mounted specimens of this scale parasite which had issued from scales on leaves collected from "orchid vine" (*Stigmaphyllon ciliatum*) at the Waialua Club House, Dec. 13, 1939. A large proportion of the scales showed exit-holes of the parasite. The scale may be *Aspidiotus hederae* (Vall.). This parasite was collected by Mr. Koebele years ago, but it has not been again reported for quite a number of years.

Uscana semifumipennis Girault.—Mr. Swezey exhibited an algaroba pod with numerous bruchid eggs on the surface. By actual count, there were 125 of the eggs, 72% of which were parasitized by the trichogramatid *Uscana semifumipennis*. The pod was one among others sent from Puako, Hawaii, by Leslie Wishard, Jan. 4, 1940.

Mr. Ashley C. Browne submitted the following notes: On December 27, 1939 egg masses and large numbers of individuals of all sizes of *Murgantia histrionica* (Hahn) the harlequin cabbage bug were collected from old, neglected broccoli plants on a farm in the Lualualei Valley. Nearby string bean plants did not seem to be infested.

On January 2, 1940 larvae of *Listroderes obliquus* (Gyll.) were collected at Kula, Maui by Assistant County Agent James Shigeta where they were reported doing considerable damage on Chinese cabbage and turnips. This is believed to be the first report of their attacking turnips. In 1939 Dr. Holdaway collected the insect from potatoes on Maui.

Protoparce quinquemaculata blackburni (Butl.)—Tobacco horn worms were seen to be doing extensive feeding on egg plant foliage at Keopu, Molokai. Damage was severe and the infestation was heavy. Also found on eggplant at Nawiliwili, Kauai.

Following was a discussion of the status of the introduced crayfish on Oahu.

FEBRUARY 1, 1940

The 410th meeting was held at the H.S.P.A. Experiment Station, February 1, 1940, at 2:30 p.m.

Members present: Miss Ethel Lucas, Messrs. Bianchi, Bishop, Browne, Bryan, Ehrhorn, Fullaway, Holdaway, Illingworth, Keck, Look, Marlowe, Mason, McBride, Pemberton, Rosa, Sakimura, Swezey, Van Zwaluwenburg, Williams and Zimmerman.

Visitors: Miss Bernice Harper, Mr. Lyle Stephenson and Drs. A. C. Baker and P. N. Annand.

President Marlowe in the chair.

The minutes of the previous meeting were read and approved as corrected.

Mr. R. G. Oakley was elected to active membership.

The Secretary reported that at the Executive Committee meeting held ten minutes before this present 410th regular meeting, it was voted to accept a paper on Hawaiian Oechalia (Hemiptera) that had been slightly delayed, for Proceedings Hawaiian Entomological Society, X, No. 3, 1939. The bill from Science Press Printing Company, Lancaster, Pa., amounting to $716.24 for printing the 500 copies of the Proceedings, No. 2, was submitted and accepted. It was also approved that the acting-director of the Pineapple Experiment Station be approached for funds from his institution to help liquidate the above printing bill.

At the regular meeting Mr. E. C. Zimmerman proposed that a vote of thanks be extended to the editorial committee for their considerable work on publishing the "Proceedings". Seconded and passed.

Following a considerable discussion, Mr. E. H. Bryan, Jr., made a motion that the day of the regular monthly meetings be changed from the first Thursday to the first Monday of each month. Mr. E. C. Zimmerman seconded the motion. Passed.

Mr. E. C. Zimmerman introduced Miss Bernice Harper, new member of the entomological staff at the Bishop Museum. F. X. Williams introduced Mr. Lyle Stephenson, visitor from Kansas City, Mo., who was interested in entomology and natural sciences generally.

PAPER PRESENTED

Mr. Swezey presented a paper entitled: "Notes on Food-Plant Relations of Scolytidae and Platypodidae in the Hawaiian Islands".

NOTES AND EXHIBITIONS

Miss Ethel Lucas presented the following communication: Record of the Cabbage Looper, *Autographa brassicae* Riley, in Hawaii.

Autographa brassicae, the cabbage looper found throughout the United States, is here recorded for the first time in Hawaii. Four separate records were obtained during the survey of parasites of *Pontia rapae* conducted by the Entomology Department of the Hawaii Experiment Station.

First on December 6, 1939 from Kamalo, Molokai, when four pupae obtained from cauliflower were sent by D. Akana, county agent.

Next on December 7, 1939, when four larvae were collected on head cabbages growing on the University of Hawaii campus.

Then on January 6, 1940, when N. Kawakami, county agent, sent in four larvae on head cabbages from Kokee, Kauai.

And again on January 18, 1940, H. F. Willey, county agent, sent in three larvae on cauliflower from Waiakoa, Maui.

An attempt is being made to determine whether the insect occurs also on Hawaii, and to secure additional records from the other islands.

Specimens of the moth and of the related *Plusia chalcites* were exhibited. Mr. D. T. Fullaway remarked that *A. brassicae* has been reaching the Territory during the last several years on mainland vegetables.

Dr. F. G. Holdaway and Mr. Wm. Look presented the following note: Fire ant (*Solenopsis geminata*) attacking young crop plants. Young plants of three different crops have been attacked and damaged by *Solenopsis geminata* at or below ground level: tomato plants at Lualualei, cucumber seedlings at Waipahu and young egg plants at Koko Head. The tender stem is gnawed and the plant wilts, becomes unthrifty and may die. Damage caused by the ant has been responsible for sections of fields of cucumbers at Waipahu being replanted.

During the past month this species of ant has been found gnawing into the midrib of leaves of Chinese cabbage at Lualualei. Examples of damage to cucumber seedlings are exhibited.

Mr. O. C. McBride introduced Drs. A. C. Baker and P. N. Annand, of the Bureau of Entomology, U.S.D.A. Mr. C. B. Keck was welcomed from his sojourn on the mainland.

MARCH 4, 1940

The 411th meeting was held at the H.S.P.A. Experiment Station, Monday, March 4, 1940, at 2:30 p.m.

Members present: Miss Bernice Harper, Miss Ethel Lucas, Messrs. Bianchi, Bryan, Carter, Ehrhorn, Illingworth, Look, Marlowe, McBride, Oakley, Pemberton, Rosa, Swezey, Van Zwaluwenburg, Williams and Zimmerman.

President Marlowe in the chair.

The minutes of the previous meeting were read and approved as corrected. Miss Bernice Harper was unanimously elected to membership.

The second Monday of each month appearing more suitable than the first Monday, for meetings of the Hawaiian Entomological Society, it was moved by Mr. R. H. Van Zwaluwenburg and seconded by Mr. E. C. Zimmerman that, beginning in April, the meeting be held on the second Monday of each month. Passed.

PAPERS PRESENTED

On behalf of Mr. William H. Anderson, U.S.D.A., Mr. O. H. Swezey presented a paper entitled: *"On Some Larvae of the Genus Proterhinus (Coleoptera: Aglycyderidae)"*. Mr. C. E. Pemberton gave a book review of "Fleas of Eastern United States", by Irving Fox, Feb. 1940, VI + 191 pp., 166 figs., 31 pls., published by the Iowa State College Press. The volume was particularly recommended as being easily workable not only for the specialist but for the general entomologist. The clear cut figures are of considerable assistance.

NOTES AND EXHIBITIONS

Mr. F. A. Bianchi exhibited male and female specimens of an *Amblyteles* wasp taken by him at Waialua, Oahu. It is apparently new to the Islands and constitutes the fourth species now known here.

Onthophagus incensus Say.—Mr. Swezey exhibited a specimen of this scarabaeid beetle which was collected from cowdung in Makua Valley, Feb. 22, 1940. It was found to be quite abundant there. Its presence was indicated by the little heaps of soil appearing at the deposits of cowdung along the trail. A half dozen specimens were obtained at one place. The beetle was introduced from Mexico in 1923, and the first record of its having become established was on the island of Hawaii in 1934. Apparently it had not yet been recorded from Oahu.

Cryptolucilia caesarion (Meigen).—Mr. Swezey reported observing two of this green fly on cowdung in Makua Valley, Feb. 22, 1940. They were not captured. It is the immigrant fly first reported in 1934 on the island of Hawaii, and later collected on Oahu at Kawela Bay, Dec. 16, 1934, and at Koko Head, Jan. 13, 1935.

Poecilips persicae (Hopkins).—Mr. Swezey pointed out that this scolytid which was determined by Dr. Schedl last year from material obtained from *Pipturus* on Tantalus in 1930, is the same that he had reported as a possible new immigrant reared from old avocado seed in 1937, and reported in Proceedings Hawn. Ent. Soc., X, No. 2, p. 176, 1939 as a "New Scolytid".

Iso-amylamine as an Attractant for Syrphid Flies.—Mr. Van Zwaluwenburg reported that while preparing a highly dilute mixture of iso-amylamine with diatomaceous earth in the laboratory, he noted a sudden influx of dozens of *Lathryophthalmus arvorum* (Fabr.) adults through the open windows. Even when the mixture was taken outside on the lawn, numbers of this syrphid were attracted to the general vicinity of the chemical. It is not known if the flies were all of one or both sexes. Travis, in Iowa, has reported (Jl. Econ. Ent. 32, p. 692, 1939) that iso-amylamine stimulated activity among males of *Phyllophaga lanceolata* (Say).

Mr. C. E. Pemberton reported finding the pink sugar cane mealybug (*Trionymus sacchari*) abundant just underground on the stalks and stool mass of "Johnson Grass" (*Holcus halepensis*). None of its enemies was seen.

Dr. Walter Carter spoke of mass movements of sowbugs (Isopoda, Crustacea) in the Diamond Head area, Honolulu, into new houses. He mentioned E. O. Essig's recommendation of trapping sowbugs under wet sacks. Mr. Pemberton said that he had found sowbugs common under stones, in this region and not concentrated during wet weather and that in dry spells they move about seeking moisture.

Syagrius fulvitarsus Pascoe.—Mr. Zimmerman reported a severe infestation of the Australian fern weevil in *Asplenium nidus* (bird nest fern) in Nuuanu Valley, Oahu. The weevil has not been reported damaging this species of fern heretofore. Large ferns were attacked and all fronds riddled with mines. The adult weevils fed at night on the young, curled fronds at the base of the plant.

A discussion followed on measures against the weevil, which seemed particularly bad of late. Among the remedies suggested were the use of Pyrethrum extract to drive out the adults, Chinese hair soap (made of *Sapindus saponaria*) for the same purpose, the use of tangle foot, etc.

Dr. F. X. Williams exhibited the third specimen taken in Hawaii of the sclerogibbid wasp (*Mystrocnemis embiidarum* Kieffer) which he took on some paper on his desk. Mr. O. H. Swezey spoke of how it parasitized some *Oligotoma* offered it, although none of its eggs developed.

APRIL 8, 1940

The 412th meeting was held at the H.S.P.A. Experiment Station, April 8, 1940, at 2:30 p.m.

Members present: Miss B. Harper, Miss Ethel Lucas, Messrs. Bianchi, Bryan, Ehrhorn, Fullaway, Holdaway, Illingworth, Krauss, Look, Marlowe, McBride, Oakley, Pemberton, Rosa, Swezey, Van Zwaluwenburg, Williams, Zimmerman.

Visitor: John T. Moir, 3rd.

President Marlowe in the chair.

The minutes of the preceding meeting were approved as read.

Dr. F. G. Holdaway stated that three meetings of the Committee on common names of insects had already been held and that the list should be completed in the near future.

PAPER PRESENTED

Dr. J. F. Illingworth presented a paper entitled "Feeding Habits of Bufo".

New Host Plant Records for Corn Earworm in Hawaii.—Miss Ethel Lucas stated that corn earworm, *Heliothis armigera* (Hub.), was severely infesting head lettuce in North Kohala, Hawaii, during October of 1939. Six larvae were obtained in material submitted to the Entomology Department H.A.E.S. Four of these larvae died in a wilted condition; two pupated, one of these rotted and the other shrivelled so that no adults emerged.

These observations are in keeping with a recent paper by N. Stahler in California (Journ. Econ. Ent. 32 (1) : 151). He found that corn earworms were very difficult to rear on lettuce due to a high mortality from what he considered was a wilt disease.

The following are additional host plant records:

Eggplant fruits were found being attacked by corn earworms at Waipahu in June 1938, by F. G. Holdaway and A. C. Browne.

In January 1939, George Marvin found corn earworms infesting the foliage of carrots in North Kohala, Hawaii. Corn earworm was found infesting pods of lima beans at Waimea, Hawaii in October of 1939, by George Marvin.

Corn earworm has also been noted during March 1940 feeding on Chinese peas and string beans at Waipahu School Gardens, and was bred on Italian squash from that locality.

Corn Earworm Attacking Irish Potato.—Mr. William C. Look stated that a number of corn earworms, *Heliothis armigera* (Hub.), were found attacking the foliage of Irish potato last year about the time when Mr. Van Zwaluwenburg reported its presence on potato at Waipahu. Eggs and larvae were found on January 12, 1939 at Poamoho. On March 6, 1939 Mr. Norman King collected this species on potato at Hoolehua, Molokai. A number of eggs and larvae were again collected on the last winter crop in every month from November 1939 to March 1940, inclusive, at Poamoho.

Though this caterpillar has in the past been assumed to be uncommon on potato, these records show that it can occur commonly on potato foliage.

Mr. Look also presented a note as follows: *Entomophthora* sp., a Parasitic Fungus on *Pycnoderes quadrimaculatus* Guerin.

A species of parasitic fungus identified by Dr. E. A. Bessey as *Entomophthora* sp. has been found on the bean capsid, *Pycnoderes quadrimaculatus* at Lualualei. Parasitized adults have been collected from the lower surface of old leaves of pumpkin (*Cucurbita* sp.), dishcloth gourd (*Luffa acutangula*), white mustard cabbage (*Brassica chinensis*), and the wild spiny-cucumber (*Cucumis dipsaceus*). Although this bug is also very abundant and injurious on beans,

parasitized individuals have not yet been found associated with the bean plant. Specimens of parasitized adults are exhibited.

Dr. F. G. Holdaway presented notes as follows: Datura Beetle *Lema trilineata* var. *californica* Schaeffer Attacking Eggplant and Irish Potato. Records. Datura beetle, *Lema trilineata californica* attacking eggplant at Koko Head, June, 1938, and at Honaunau, Kona, Hawaii, Sept. 6, 1938. Since we obtained these records Mr. Look has recorded it on eggplant at Lualualei, Oahu, June 22, 1939 and breeding on eggplant at Lualualei, July 13, 1939. He also recorded it on eggplant at Koko Head, Sept. 21, 1939 and on eggplant at Puuloa, Oahu, Jan. 15, 1940. More recently, March 13, 1940, he has recorded it breeding on Irish potato at Poamoho. We are informed that the insect attacks Irish potato at Kona, also. We have also taken it from corn, papaya and tomatoes. Further observations will determine whether these crops should be added to the list of hosts.

Occurrence of *Opius fletcheri* Silv., parasite of melon fly, *Chaetodacus cucurbitae* (Coq.).

Recorded the occurrence of *Opius fletcheri* ovipositing in melon fly-attacked flowers of pumpkin at Waipahu School Gardens, April 3, 1940. About a dozen adults were observed active in an area of 2-3 square yards, about 3 p.m.

Mr. A. C. Browne listed Jarvis & Enderbury Insects as follows:

Jarvis Id., March 17, 1940.

12 *Petrochroa dimorpha* Busck (very abraded)
17 " n. sp. (not *neckerensis*)
3 *Reduviolus capsiformis* Germar
9 *Trichoptilus oxydactylus* (Walker)
13 *Hecamede albicans* Meigen (*persimilis* Hendl.) (Ephydridae)
1 *Nysius* sp. (not *pacificus* China)
3 Tenebrionid: *Alphitobius laevigatus* (F)
1 Nymph: *Oechalia consocialis* Boisd.

Enderbury Id., March 13, 1940.

Tetramorium simillimum (Smith)

Polistes olivaceus (De Geer).—Mr. Swezey exhibited a large nest of this wasp, which was collected from beneath an eave of a residence at the Waipio Substation, H.S.P.A., March 24, 1940. It was 5 inches in diameter and contained 337 cells, many of them occupied with young larvae of various sizes. About a hundred wasps were present on the nest at the time of capture. It is remarkable for so large a colony to occur at this season of the year when usually new nests are only being started. This nest is as large as the maximum which are to be found late in summer after the colony has had time to build up its maximum population.

Mr. D. T. Fullaway exhibited specimens of the coprid beetle, *Ataenius pacificus* Sharp taken at Kaimuki, Honolulu; the ginger weevil, *Elytroteinus subtruncatus* (Fairm.), bred in quarantine from the trunk of a *Marattia* fern from Tahiti; and *Nesopimpla naranyae* Ashm. (Ichneumonidae), found on a quarantine room window and having perhaps issued from caterpillars in dried fruits from Japan.

Dr. F. X. Williams spoke of the rather extended distribution of one of our little dolichopodid flies, *Chrysotus pallidipalpus* V.D. (= *C. elegans* Parent). It has already been recorded from France, Holland and England. Its hothouse habits probably helped its dispersal.

Mr. E. C. Zimmerman mentioned that the Bishop Museum had published as No. 32 Dr. Blair's paper on the weevils of the genus *Araucaricola.*

MAY 13, 1940

The 413th meeting was held at the H.S.P.A. Experiment Station, on Monday, May 13, 1940, at 2:30 p.m.

Members present: Miss Bernice Harper, Miss Ethel Lucas, Messrs. Bryan, Carter, Ehrhorn, Fullaway, Hadden, Holdaway, Krauss, Look, Marlowe, Pemberton, Rosa, Sakimura, Swezey, Van Zwaluwenburg, Williams and Zimmerman.

Visitor: W. P. Naquin, Jr.

President Marlowe in the chair.

The minutes of the preceding meeting were read and approved as corrected.

Dr. F. G. Holdaway presented the completed list of common names of insects used in Hawaii and revised April, 1940. After some discussion, Dr. Walter Carter moved that the committee's report be received and submitted to the Society for comment; seconded and passed.

NOTES AND EXHIBITIONS

Miss Ethel Lucas presented an additional note on occurrence of *Opius fletcheri* parasite of the melon fly as follows: A handful of 11 hyacinth beans (*Dolichos lablab* L.), collected on April 21, 1940 at the U. H. Nutrition plot, were found to be infested with melon fly larvae. Sixty adult melon flies and 39 adults of *Opius fletcheri* emerged. All the pods were attacked by the fly and the infestation represents a high average of 9 larvae per pod. Parasitism of approximately 39% is particularly high for *Opius fletcheri;* perhaps the very flat pod of the hyacinth bean is a factor. Specimens of bean pods and parasites exhibited.

Mr. E. M. Ehrhorn exhibited two species of orb-spinning spiders he found in his garden. *Cyclosa* sp. arranges her cocoon vertically bead-like, herself being stationed at the lower end. *Uloborus,* probably *geniculatus,* a pantropic species spins a squarish nest and forms a star-shaped egg sac. The specimens were determined by F. X. Williams.

Mr. Ehrhorn also reported that some *poha* in his garden had been attacked by the chrysomelid, *Lema trilineata* but that half of these beetle larvae had been eaten by an undetermined predator.

Mr. N. L. H. Krauss submitted the following notes:

Lema trilineata californica Schaeffer.—Adults abundant on Jimson Weed (*Datura stramonium* Linn.) at Makena, Maui April 14, 1940. One adult collected on Tree Tobacco (*Nicotiana glauca* Graham).

Pepper Weevil, *Anthonomus eugenii* Cano. One adult collected on Jimson Weed, Makena, Maui, April 14, 1940.

Painted Lady, *Vanessa cardui* (Linn.).—Larvae abundant on Tree Tobacco on road between Kula Sanitarium and Makena, Maui, April 14, 1940.

Sphingid eggs, probably of *Protoparce quinquemaculata blackburni* (Butl.) fairly abundant on leaves of Tree Tobacco, on road between Kula Sanitarium and Makena, Maui, April 14, 1940.

Ereunetis flavistriata Walsm.—Mr. Swezey reported that of 19 cocoons of this moth collected on cane at Waipio, Oahu, April 13, 1940, 10% had been parasitized by *Melittobiopsis ereunetiphila* Timb., and 16% by an undetermined chalcid, not previously known about.

Chalybion caeruleum (Linn.).—Mr. Swezey exhibited a female of this wasp which had matured April 26 from a cocoon formed in October, 1939. The larva had fed on blackwidow spiders stored in a cell of *Sceliphron caementarium* found on under surface of a loose coral stone, Oct. 12, at Lualualei, Oahu. An egg was attached to one of the spiders. It hatched and finished its growth, consuming the spiders, and made its cocoon before Oct. 30, in a vial. Some time in March the cocoon was opened and it was found that the larva was still in the hibernating condition. However, it pupated about March 30, after about 5 months hibernating as a larva.

Sclerodermus polynesialis Saunders (?).—Mr. Swezey exhibited what appeared to be this species of bethylid. He had obtained a large number of them from a dead branch of *Poinciana,* 15 inches by 1½ inch in diameter, brought in by Mr. J. P. Martin, from Rocky Hill, February 19, 1940. The branch was infested with longicorn larvae, and was retained for the issuing of the adult beetles. On May 10, 1940, on being examined a number of the *Sclerodermus* had already issued. The whole branch was cut up, and 4 adult beetles (*Ceresium unicolor*) were found dead. Also

207 adult *Sclerodermus* were found dead. They were: 14 winged males; 95 winged females; 98 wingless females. An unknown number had escaped. There were 12 clusters of empty *Sclerodermus* cocoons, from which no doubt all of the adults had issued. One cluster was composed of 52 cocoons. Each cluster of cocoons were of the larvae which had fed on a single longicorn larva.

Dactylosternum hydrophiloides M'Leay.—This hydrophilid beetle was introduced from Los Banos, Philippine Islands, 1925, to be used as a predator on the sugar cane beetle borer *Rhabdocnemis obscura,* and liberated at Honokaa, Hawaii. Recovered by C. E. Pemberton in decaying banana stumps in a cane field at Honokaa, April 27, 1940.

Mr. Pemberton called attention to flight of *Coptotermes formosanus* that was taking place in the station grounds and alongside the meeting room window. This flight was noted from early morning and was in its second day. Such a diurnal flight in this exact locality had also taken place May 7 and 8, 1939. Feasting on the termites were mynah birds, sparrows and the two dragonflies *Anax junius* and *Pantala flavescens.* Mr. Pemberton placed a *Bufo marinus* on the lawn and it immediately commenced feeding on the termites.

Telsimia nitida Chapin.—Mr. Swezey stated that he had recently had from Dr. E. A. Chapin the determination of a tiny black lady-beetle under the above name. It is the beetle which occurs in Guam and holds in check the coconut scale *Aspidiotus destructor.* This beetle is the one for which we have been using the name *Cryptogonus nigripennis* on account of specimens having been previously erroneously determined.

Mr. F. C. Hadden being called upon by the president, gave an interesting account of some of the faunal aspects of Midway and Wake Islands.

JUNE 10, 1940

The 414th meeting was held at the H.S.P.A. Experiment Station on Monday, June 10, 1940, at 2:30 p.m.

Members present: Messrs. Browne, Bryan, Ehrhorn, Krauss, Mason, Oakley, Pemberton, Rosa and Van Zwaluwenburg.

In the absence of both the president and vice-president, Mr. Pemberton was chosen to preside; Mr. Van Zwaluwenburg served as acting secretary.

The minutes of the previous meeting were read and approved.

Mr. Ehrhorn made remarks on some of the coccid common names chosen by the committee which compiled the common names list.

NOTES AND EXHIBITIONS

Dipterous larvae in celery.—Mr. Krauss exhibited for Mr. Fullaway a pupal case of a fly collected at Honolulu in celery from Kekaha Plantation, Kauai, in May, 1940 by Mr. Tem F. Chong, Plant Inspector. All of the larvae collected were parasitized by a pteromalid wasp, specimens of which were also exhibited.

Lema trilineata californica Schaeffer.—Mr. Krauss reported that this chrysomelid beetle was collected at the Nonaka farm, Hanapepe, Kauai, May 18, 1940 on eggplant by Robert C. Eckart, County Agent. Mr. Eckart states that he first saw this species on the same farm in March or April, 1939, and has found it nowhere else on the island. This is the first record of the species from Kauai.

Cryptorhynchus mangiferae (Fab.).—Mr. Ehrhorn mentioned the severe loss of small fruits of mango, particularly of the Pirie variety, this year, due to their dropping as a result of the work of the larvae of this beetle.

Hermetia illucens (L.).—Mr. Pemberton exhibited a specimen of this large stratiomyid fly which he collected from a window screen at 2216 Manoa Road, Honolulu, on June 7, 1940. This is the first record of its occurrence on the island of Oahu. Its first appearance in the Territory was on the island of Hawaii, where Dr. Williams collected specimens during 1932.

Chlorophorus annularis (Fab.).—Mr. Pemberton exhibited a specimen of this cerambycid collected that day by Mr. J. P. Martin in cane on the H.S.P.A. Experiment Station grounds. It is an oriental species and is known to issue here from the bamboo of screens imported from Japan.

Bythoscopus robustus (Uhler).—Mr. Van Zwaluwenburg exhibited a specimen of this cicadellid taken by a school boy, Jack Larsen, in a lighted room in Kaalawai in May, 1940. This is a new locality record for Oahu. First taken by Mr. Swezey in 1933 at Kawela Bay on this island, it was later collected by him on an automobile windshield in Manoa Valley.

Bufo marinus (L.) *fatal to lizards.*—Mr. Oakley reported experiments conducted at his suggestion on Guam, which tend to confirm the opinion that the introduced giant toad is at least partially responsible for the reduction in numbers of the large iguana or monitor lizard on that island. Lizards all died after a few days' confinement in a pen with the toads, and eye-witnesses stated that repeatedly, after attacking toads, lizards went into convulsive spasms and expired shortly afterwards. The result was the same whether the toad was consumed or only bitten. In the opinion of Guam residents the iguana has become noticeably less numerous since the introduction of Bufo to that island in 1937.

JULY 8, 1940

The 415th meeting was held at the H.S.P.A. Experiment Station on Monday, July 8, 1940, at 2:30 p.m., with President Marlowe in the chair.

Members present: Miss Suehiro, Messrs. Bianchi, Callaghan, Ehrhorn, Keck, Krauss, Marlowe, McPhail, Oakley, Rosa, Van Zwaluwenburg and Pemberton.

The minutes of the previous meeting were read and approved.

PAPER PRESENTED

Mr. F. A. Bianchi read a paper entitled "Thysanoptera and Aphididae new to the Island of Midway".

NOTES AND EXHIBITIONS

Hermetia illucens (L.).—Mr. Ehrhorn exhibited a specimen of this fly, which he caught in the basement of his residence in Manoa Valley. Mr. Rosa stated that he captured one specimen during June, 1940 at the H.S.P.A. Experiment Station.

Puliciphora sp.—Mr. Pemberton exhibited adults and larvae of this wingless phorid, together with a culture plate of nutrient agar in which the larvae of this fly were actively feeding and developing. The sterile culture medium was prepared by the Pathology department of the H.S.P.A. Experiment Station on July 3, 1940. On July 5 many adults of this fly were noticed in the covered culture dish and had deposited eggs over the surface of the agar nutrient. Larvae were abundant in the dish by July 7. Owing to its minute size this very active fly can penetrate small crevices around the edges of covered culture dishes and seriously contaminate bacterial and other cultures in the laboratory.

Several members participated in a general discussion of the possible causes for the definite reduction in numbers of *Bufo marinus* during the past year. It was suggested that subsidence has resulted following destruction by mongooses and rats, upset in sex ratio with great reduction in the proportion of females to males, the large consumption of young by old toads and the general scarcity of readily available food around breeding places.

There was also a considerable discussion on insect quarantines with respect to trans-Pacific airplanes, control of *Adoretus sinicus* through hand-picking of adults at night and the use of spray repellants against the melon fly.

AUGUST 12, 1940

The 416th meeting was held at the H.S.P.A. Experiment Station on Monday, August 12, 1940 at 2:30 p.m., with President Marlowe in the chair.

Members present: Messrs. Bianchi, Look, Ehrhorn, Krauss, Rosa, Carter, Marlowe, Mason, McBride and Pemberton.

Visitor: P. W. Weber.

The minutes of the previous meeting were read and approved.

Mr. F. A. Bianchi, reporting for the editorial committee, stated that he had read and corrected the final proof on the Proceedings of the Society for the year 1939 and that it had been returned to the publishers with the expectation that the printed Proceedings would be ready for distribution at an early date.

NOTES AND EXHIBITIONS

Agromyza simplex and *Adoretus sinicus* on Asparagus.—Mr. Bianchi spoke of a visit made by him on August 7 to a large planting of asparagus at Pupukea Ranch, Oahu. He stated that the crop is in very poor shape, due apparently to unusually severe damage by the fly *Agromyza simplex* and the beetle *Adoretus sinicus*. It is difficult to find, in an area of some 20 acres, a single stalk of asparagus that has not been attacked by the fly. Though only a few living larvae are left in the borings and no adult flies were seen, it was ascertained through a count of puparia from which flies had already emerged that from one to twenty larvae had bored into each stalk; the average number of empty puparia left in 20 stalks collected at random being 5.5 Since many puparia disintegrate "in situ" in the course of time and many are lost in the process of gathering the asparagus stalks, these figures are probably considerably below the true average.

With asparagus material injured by the fly, Mr. Bianchi also exhibited slide mounts of a parasite which he had found on *Agromyza simplex*. This appears to be the aphelinid *Centrodora xiphidii* (Perk.), which is already known in the Territory as a parasite in the eggs of the locustid *Conocephalus saltator* and in the cocoons of the dryinid *Haplogonatopus vitiensis*. Presumably this same parasite had attacked many eggs of *Conocephalus* on the asparagus plants examined by Mr. Bianchi, but, in contrast, only 5 out of 111 puparia of *Agromyza simplex* showed evidence of having been parasitized. One of these puparia contained about 20 parasites which though fully developed had failed to emerge.

The harm done to the asparagus plants by the borings of *Agromyza*, according to Mr. Bianchi, is even more difficult to estimate in this case than usual because it is obscured by the more severe damage due to the work of *Adoretus*. More apparent in the S. W.

half of the field, the work of the beetle extends to all portions of it and consists of extensive defoliation and decortication of the plants, the decortication resembling very much the work of the beetle roach, *Diploptera dytiscoides,* on certain plants. Due to this damage to the plants, large areas of the field are now brown rather than green and it is obvious that such damage must be the result of an unusually heavy infestation of *Adoretus,* which by now, to judge from the great abundance of the parasite *Scolia manilae,* should be considerably reduced from its original intensity.

Euscepes postfasciatus (Fairm.).—Mr. Bianchi stated on behalf of Mr. Ashley Browne that sweet potatoes had been sent to him from Halawa Valley, Hawaii, infested with the West Indian sweet potato weevil, *Euscepes postfasciatus* (Fairm.). This is a new locality record for that pest.

Adoretus sinicus Burm. and *Anomala orientalis* (Waterh.).—Dr. Carter stated that at Kunia, Oahu he had observed *Adoretus* to be more prevalent in first plantings of pineapples than in old fields, whereas *Anomala* infestations were in the reverse order. He was of the opinion that the weed complex in young plantings of pineapples accounted for the abundance of *Adoretus* there at that time.

Oxya chinensis (Thun.).—Mr. Bianchi reported seeing this grasshopper feeding heavily on a pineapple plant at his Honolulu home.

Rhagoletis sp.—Mr. Krauss exhibited larvae of the Cherry Fruit Fly found infesting a box of cherries shipped from Seattle, Washington on the S.S. Makiki arriving in Honolulu July 31, 1940. Owing to the great variety of fruits grown in Hawaii at various elevations, there was some discussion of the possibility of this fruit fly ultimately becoming established in the Islands through the importation of infested cherries. Mr. Krauss called attention to an account in the Entomologist's Monthly Magazine (Vol. 76, No. 912, p. 112, 1940) of the rearing of Mediterranean Fruit Flies *Ceratitis capitata* Wied. from apples grown in a garden in Middlesex, England.

Lema trilineata californica Schaeffer.—From data supplied by Ashley C. Browne and Earl Nishimura of the Hawaii Agricultural Extension Service, Mr. Krauss stated that the datura beetle had been collected from eggplant at lower Keopu, North Kona, Hawaii on July 3, 1940 and also from poha plants at Waiaha, North Kona, on July 10.

Copris incertus var. *prociduus* (Say).—Mr. Marlowe stated that at about 11 a.m. on August 1, 1940, he observed a great abundance of this Mexican dung beetle at an avocado grove on the Pupukea Trail, Waimea, Oahu. The beetles were concentrated in some horse manure and the soil beneath to a total depth of 5 to 6 inches; the area occupied being about 28 inches square. The manure covered the surface of the area to a depth of about 2 inches. A sample lot of

beetles, 350 in number, was collected in a few minutes. It was conservatively estimated that there were about 4,000 beetles massed in this spot. Very seldom are there more than a dozen beetles found in such situations. This beetle was introduced into Hawaii from Mexico in 1922 to help in the control of the horn fly. It is quite common on the islands of Maui and Molokai and has been found in the vicinity of Honolulu. This is the first record of the occurrence of this beetle at Waimea and on windward Oahu.

Mr. Ehrhorn called attention to the 20th Annual Report of the California Department of Agriculture and remarked particularly on the thoroughness and magnitude of the work conducted by the State on Plant Quarantine.

Dr. Carter exhibited and demonstrated the operation of an instrument used by the entomologists of the United States Bureau of Entomology and Plant Quarantine at their Japanese Beetle laboratory at Moorestown, New Jersey, in propagating a bacterial disease of the grubs of this beetle known as the "milky" disease. He also showed a slide mount of the "milky" disease bacteria. Dr. Carter stated that the disease can be propagated only within the bodies of live grubs and that infection takes place in surface wounds on the body. Since the organism is highly resistant to drying, grubs which have died from infection can be ground up and mixed with a dry carrier such as talc and the contaminated dust spread in the soil where grub control is desired. He stated that he had evidence leading him to believe that both *Adoretus sinicus* and *Anomala orientalis* are susceptible to infection by this disease.

SEPTEMBER 9, 1940

The 417th meeting was held at the H.S.P.A. Experiment Station on Monday, September 9, 1940 at 2:30 p.m., with Vice-President Zimmerman in the chair.

Members present: Miss Bernice Harper, Messrs. Keck, Mason, Swezey, Ehrhorn, Krauss, Browne, Bryan, Bianchi, Callaghan, Rosa, McBride, Sakimura, Zimmerman, Fullaway, Holdaway and Pemberton.

Visitors: August Busck and G. B. Stewart.

The minutes of the previous meeting were read and approved.

NOTES AND EXHIBITIONS

Mr. Ehrhorn exhibited some stems of "poha", *Physalis peruviana* Linn., collected in Manoa Valley, Honolulu on September 7, 1940, which were infested with *Pulvinaria psidii* Mask. or *P. urbicola* Ckll. These coccids were heavily parasitized by *Ameristus ceroplastae* How.

Cycloptilum sp.*—Mr. Pemberton exhibited specimens of a cricket not previously collected in the Territory. A dozen specimens were caught in a house on Alewa Heights, Honolulu, by Mrs. E. D. Brown.

Messrs. Swezey and Zimmerman gave an extremely interesting account of a three months' collecting trip which they had just completed in British and American Samoa. Mr. Swezey exhibited several boxes of Lepidoptera collected on the trip and showed some examples of typical leaf damage to various plants by a number of different insects. It was estimated by Mr. Zimmerman that their joint collecting resulted in obtaining from 30 to 40 thousand specimens and that a large number of new species are represented in the collection. The expedition clearly demonstrated an unexpected richness in the insect fauna of the Samoan group and the need for additional surveys. The work was accomplished under unusually wet conditions. They were particularly impressed with the large number of Samoan insects not in Hawaii, which are destructive to economic and ornamental plants.

Mr. Swezey presented a paper entitled "Some Injurious Insects in Samoa, which do not occur in the Hawaiian Islands".

Mr. Zimmerman introduced Mr. August Busck, the distinguished Micro-Lepidopterist from the U.S. National Museum, who has come to Hawaii to spend several months at the Bishop Museum working on the Micro-Lepidoptera at that institution. Mr. Busck brought greetings and good wishes to the Hawaiian Entomological Society from Dr. L. O. Howard, who has several times in the past also honored this Society with his presence.

OCTOBER 14, 1940

The 418th meeting was held at the H.S.P.A. Experiment Station on October 14, 1940, at 2:30 p.m., with President Marlowe in the chair.

Members present: Miss Ethel Lucas, Messrs. Bianchi, Bryan, Callaghan, Fullaway, Holdaway, Illingworth, Keck, Look, Marlowe, Mason, McPhail, Oakley, Pemberton, Rosa, Swezey, Van Zwaluwenburg and Zimmerman.

Visitors: Messrs. August Busck and Leith F. Hitchcock.

The minutes of the previous meeting were read and approved.

The Acting Secretary reported that the Executive Committee had passed the following resolution: That the Hawaiian Entomological Society type collection of Hawaiian Micro-Lepidoptera be trans-

* Later determined as *Cycloptilum bimaculatum* (Shiraki) by A. B. Gurney of the U. S. National Museum. [Ed.]

ferred on loan to the Bishop Museum for purposes of study by Mr. August Busck.

Mr. Warren C. Goolsby was nominated for membership by Mr Oakley.

After a discussion led by Mr. Keck, showing the desirability of modifying the existing quarantine regulations governing the importation of queen bees as a precaution against the introduction of American foul brood, a disease now generally spread throughout the Territory, it was moved and unanimously passed: That the Hawaiian Entomological Society go on record as favoring the modification of the existing quarantine regulations to permit the direct importation of queen bees from the mainland United States, without being subject to quarantine. The Secretary was instructed to notify the Board of Commissioners of Agriculture and Forestry of this action.

PAPERS PRESENTED

Mr. Zimmerman presented a short paper on the "Argentine Ant".

Mr. Bryan, on behalf of H. de Souza Lopes, presented a paper entitled: "Hawaiian Sarcophagidae".

Mr. Zimmerman presented another paper with the title: "A New Amblycnemus from the Caroline Islands".

NOTES AND EXHIBITIONS

Zaischnopsis sp.—Mr. Swezey exhibited a living specimen of this egg-parasite of *Holochlora japonica,* which had issued from an egg in hibiscus twig collected in his garden in Manoa, Oct. 22, 1939. The eggs when found were already parasitized, and two parasites issued in January 1940, another in May, and now this one nearly a year from the time the material was collected. It is a case of delayed development, or an extraordinary length of time in the prepupal stage.

Beetle attacking Eucalyptus.—Mr. Bianchi reported that Mr. Hitchcock and he had observed several trees of *Eucalyptus citriodora* at Waialua which had excessive quantities of gum exuding from the trunk. Examination revealed numerous small (⅛ inch in diameter) holes beneath the bark and into the wood, which had every appearance of having been caused by Coleoptera. He suggested that the entomologists be on the watch for the insect causing this damage.

Siricid from Redwood.—Mr. Fullaway exhibited a large blue siricid obtained alive at the Lewers & Cooke lumber yard in Honolulu, where it had issued from one piece of redwood and was boring into another when found late in September. This is probably a Californian species, and may be the same as the one recorded by the late W. M. Giffard in 1908 (Proc. Hawn. Ent. Soc., Vol. 2).

Tetrastichus hagenowii (Ratz.).—Mr. Pemberton exhibited the remains of an egg capsule of the roach *Neostylopyga rhombifolia* (Stoll) from which had emerged 73 specimens of this parasite. It was collected in Manoa Valley, Aug. 15, 1940.

Termites from British Columbia.—Dr. Illingworth exhibited winged forms of an unidentified termite collected in Vancouver on August 18. The insects were active despite the coolness of the weather.

Mr. Leith Hitchcock, returning to Australia after several years in the United States where he had been studying insects attacking *Xanthium,* exhibited a case of insects attacking cactus (*Opuntia*) and another of cocklebur insects. Of the latter the most important Mr. Hitchcock said was a trypetid fly which breeds in the seeds of this plant.

Mr. Van Zwaluwenburg made a few remarks on his recent stay on Canton Island. Both the native flora and native insect life are comparatively simple, there being only some 20 native species of plants, and between 60 and 70 known insects and related forms known up to the present time. A striking thing is the apparent absence of any parasite complex, the only parasitic species known being a *Baeus,** the host of which is as yet unknown.

NOVEMBER 18, 1940

The 419th meeting was held at the H.S.P.A. Experiment Station on Monday, November 18, 1940 at 2:30 p.m., with President Marlowe in the chair.

Members present: Miss Ethel Lucas, Messrs. Bianchi, Browne, Fullaway, Holdaway, Illingworth, Krauss, Look, Marlowe, Oakley, Pemberton, Rosa, Swezey, Van Zwaluwenburg, Williams and Zimmerman.

Visitor: Mr. August Busck.

The minutes of the preceding meeting were read and approved.

It was voted that the Secretary tender the thanks of the Society to the Hawaiian Sugar Planters' Association and to the Pineapple Producers' Cooperative Association for defraying the expenses of printing the Proceedings of the Hawaiian Entomological Society, X, No. 3, 1940.

The name of Dr. L. O. Howard was proposed and formally nominated by Mr. R. H. Van Zwaluwenburg as an honorary member of the Society. Seconded, approved and duly elected.

Mr. Warren C. Goolsby, nominated for full membership into the Society at the October meeting, was elected by unanimous ballot cast by the Secretary.

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* The reported presence of *Baeus* on Canton is now believed to be erroneous. [Ed.]

PAPERS PRESENTED

Mr. E. C. Zimmerman presented papers entitled as follows: "The Rhynchophorinae found in Hawaii" and "The Bostrichidae found in Hawaii".

Dr. F. G. Holdaway and Mr. William C. Look presented a paper entitled: "Insects of the Garden Bean in Hawaii".*

NOTES AND EXHIBITIONS

Latrodectus geometricus Koch. — Mr. Van Zwaluwenburg reported the finding of an adult female of this spider in a box of fruit received in Honolulu from the island of Lanai. It seems very probable that the spider originated on Lanai, and that the known range of the species can be extended to that island.

Mr. F. A. Bianchi reported that a specimen of the ichneumonid wasp, *Ecthromorpha fuscator* had flown into his automobile and had stung him and his wife.

Mr. R. H. Marlowe spoke of the rather bad cockroach situation. As a remedy he mentioned tartar emetic—one grm. into 25 c.c. of honey being 95 per cent effective.

Mr. C. E. Pemberton stated that sodium fluoride dusted on floors, etc., was also very effective.

A discussion of ant poisons followed.

Dr. F. X. Williams spoke briefly of his four-months stay in New Caledonia where insects, largely of an economic nature were studied.

DECEMBER 9, 1940

The 420th meeting was held at the H.S.P.A. Experiment Station, on Monday, December 9, 1940 at 2:30 p.m., with President Zimmerman in the chair.

Members present: Miss Bernice Harper, Miss Ethel Lucas, Messrs. Bianchi, Browne, Carter, Fullaway, Keck, Look, Mason, McPhail, Pemberton, Schmidt, Swezey, Van Zwaluwenburg, Williams, Zimmerman.

Visitors: Mr. August Busck and Dr. W. E. Hoffmann.

The minutes of the preceding meeting were read and approved as corrected.

At the meeting of the Executive Committee—members attending Messrs. Zimmerman, Pemberton, Marlowe and Williams—held a few minutes before the present meeting, the following slate of officers was proposed: President, E. C. Zimmerman: Vice President, O. H. Swezey; Secretary Treasurer, F. X. Williams; additional members of Executive Committee, D. T. Fullaway and F. G. Holdaway.

* Not available for publication. [Ed.]

The following officers were appointed by the Executive Committee: Editor, O. H. Swezey; Assistant Editors, C. E. Pemberton and Walter Carter; Librarian, J. S. Rosa; Custodian of Collections, F. X. Williams.

It was moved and seconded and carried that the secretary cast the ballot for the slate of officers.

On behalf of Mr. E. P. Mumford, corresponding member, Mr. O. H. Swezey proposed Dr. G. D. Hale Carpenter, Hope Professor of Entomology, Oxford University, Oxford, England, for corresponding member of the Society.

The Secretary read a communication from the Executive Secretary of the Board of Commissioners of Agriculture and Forestry, Territory of Hawaii, as follows:

"Your letter of October 22, 1940, requesting a modification of existing regulations to permit the direct entry of queen bees without the present quarantine restrictions was, along with other letters on the same subject considered by the Commissioners at their meeting on November 28, 1940.

"Action was deferred until the next meeting which will be held December 19, 1940".

PAPERS PRESENTED

Mr. F. A. Bianchi presented a paper as follows: "Two Thrips New to Hawaii".

Mr. D. T. Fullaway presented a paper entitled: "Check List of Parasitic Hymenoptera of the Samoan Islands, with descriptions of new species".

Mr. F. A. Bianchi presented a paper entitled: "Remarkable Longevity of a Pyrophorus Larva".

NOTES AND EXHIBITIONS

Litomastix floridana (Ashm.).—Mr. Swezey reported that during November he had collected 7 caterpillars of *Plusia chalcites* from mint in his garden on Lanihuli Drive, 6 of which proved to be parasitized by *Litomastix floridana,* which is a parasitism of 85%.

Pyroderces incertulella (Walker).—Mr. Swezey exhibited a male inflorescence of *Pandanus* collected at the University of Hawaii, which was very heavily infested with the larvae of this moth. He reported that from a similar inflorescence collected on Keeaumoku St., Oct. 11, 1940, 266 moths had issued. On several previous occasions, moths were reared abundantly from the same material. Apparently these male inflorescences are always infested by these larvae. They begin when the inflorescence is fresh, but continue feeding after it is all dried up. Examination showed how they had fed on the surface of the dry hard stems. It is evident that

this is a very abundant species in Hawaii, yet it has seldom been collected except when reared. Only one is recorded in "Fauna Hawaiiensis", collected by Perkins. It is placed by Walsingham in *Stagmatophora,* but, later (Trans. Ent. Soc. London, LXXVI, p. 497, 1928) it was transferred by Meyrick to the genus *Pyroderces,* and he recorded it from Austral Islands, also Rapa and Queensland. Thus it is shown to have a wide range in the Pacific.

Conibius sp.—Mr. Van Zwaluwenburg exhibited a series of a tenebrionid beetle which agrees closely with specimens collected on Oahu by O. H. Swezey in 1917 and 1924, identified by G. F. Bryant of the British Museum as *Conibius* near *brunnipes* Champ. The insects of the present series were collected Dec. 4 under rocks at Lualualei, Oahu by Messrs. Rosa and Van Zwaluwenburg, they were very numerous, and in association with another tenebrionid *Ammophorus insularis* Boh.

The incoming President, Mr. E. C. Zimmerman, now took the chair while the retiring president, Mr. R. H. Marlowe delivered his presidential address entitled, "Some Recent Advances in Insecticides".*

Dr. W. E. Hoffmann, Entomologist and visitor located at Canton Christian College, gave an interesting account of the situation in China.

* To be published later [Editor].

New or Little-Known Tipulidae from the Hawaiian Islands (Diptera)

BY CHARLES P. ALEXANDER
Massachusetts State College, Amherst, Massachusetts

I am indebted to Dr. Francis X. Williams for the privilege of studying three species of crane-flies that he has reared from the pupal condition and will discuss elsewhere. One of the species has never been described although it has been in my collection for some years. A second form is evidently an introduced fly whose native home is in Eastern Asia. The third species has not been reported since its original definition in 1919. The types and representative specimens have been returned to Dr. Williams and will be placed in the collection of the Hawaiian Entomological Society.

Limonia (Dicranomyia) jacobus (Alexander).

Dicranomyia jacobus Alexander, Ann. Ent. Soc. America, 12: 28-29, 1919.

Oahu: Manoa Valley, Waihi-iki, May 9, 1937; ex pupae, wet boulders. Same station, May 16, 1937; ex wet rock. Waihi-nui Falls, February 18, 1939; wet bank. Hering Valley, emerged August 19, 1933; subaquatic. All collected by F. X. Williams.

There are very slight differences in the structure of the ventromesal lobe of the basistyle of the male hypopygium from typical material from Maui but I must consider the flies as being conspecific.

Limonia (Dicranomyia) casei, sp. n. Fig. 1.

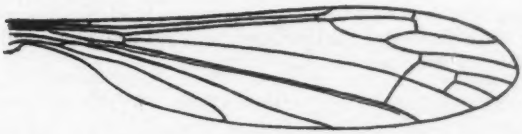

Fig. 1. *Limonia* (*Dicranomyia*) *casei,* sp.n.; venation.

General coloration gray, the praescutum with three distinct dark brown stripes; pleura pale, variegated with darker; femora yellow basally, passing into light brown at tips; wings subhyaline, unpatterned except for the oval brown stigma; abdominal tergites dark brown, the posterior borders conspicuously obscure yellow to produce a ringed appearance.

Female.—Length about 6-6.5 mm.; wing, 6.3-6.5 mm.

Rostrum and palpi brownish black. Antennae with scape and pedicel dark brown; flagellum black; flagellar segments oval, the outer ones a trifle more elongate. Head light gray; anterior vertex narrow, a little less than the diameter of scape.

Pronotum brownish gray. Mesonotal praescutum yellowish gray with three distinct dark brown stripes; posterior sclerites of notum blackened, pruinose, the posterior border of scutellum somewhat paler. Pleura pale, variegated with darker, including major black areas on the sternopleurite and meron, with less evident darkenings on the anepisternum and propleura, leaving the posterior pleurites chiefly silvery. Halteres pale. Legs with the fore coxae weakly infuscated, the remaining pair pale yellow; trochanters yellow; femora yellow basally, passing into light brown at tips; tibiae and tarsi obscure yellow to pale brownish yellow, the outer tarsal segments dark brown. Wings (Fig. 1) subhyaline, unpatterned except for the oval brown stigma; veins pale brown. Venation: Sc_1 ending opposite origin of Rs, Sc_2 close to its tip; cell *1st* M_2 closed; *m-cu* at or very close to fork of *M*.

Abdominal tergites dark brown, the posterior borders conspicuously obscure yellow to testaceous yellow, producing a ringed appearance; sternites more uniformly pale, the basal lateral portions with dark triangles. Ovipositor with cerci slender but strongly curved.

Hab. Oahu.

Holotype, ♀, Nuuanu Valley, May 4, 1915 (*A. H. Case*).

Paratypes, 2 ♀ ♀, Waihi-iki Stream, Manoa Valley, June 7, 1936 (*F. X. Williams*); 1 ♀, Lulumahu, streamside, issued from pupa, May 14, 1937 (*F. X. Williams*).

Most similar to *Limonia* (*Dicranomyia*) *hawaiiensis* (Grimshaw), differing especially in the coloration of the body, legs and wings. I have had the description in my files for several years while awaiting the receipt of more material.

Erioptera (Meterioptera) bicornifer Alexander.

Erioptera (*Erioptera*) *bicornifer* Alexander, Ann. Ent. Soc. America, 14: 116, 1921

Oahu: Honolulu, April 12-18, 1931 (*F. X. Williams*); ex mud.

Unquestionably an introduced species. Widely distributed in Eastern Asia, from the Ussuri country in eastern Siberia, throughout Korea into the major islands of Japan.

On Some Larvae of the Genus Proterhinus (Coleoptera: Aglycyderidae)

BY WILLIAM H. ANDERSON
Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

(Presented by O. H. Swezey at the meeting of March 4, 1940)

The genus *Proterhinus* includes 157 species of small, weevil-like Coleoptera confined in distribution to certain islands of the Pacific Ocean. Although several papers have been written, since 1878, concerning the adults and their relationship with other Rhynchophora, no pertinent information on the larvae was available until 1931, when Böving and Craighead[1] figured the larva of *Proterhinus anthracias* Perkins. It is with the purpose of making available information about the larvae of other species that the present paper has been prepared.

The larvae studied by Böving and Craighead, as well as those upon which the present discussion and descriptions are based, were collected and sent to the United States National Museum by Mr. O. H. Swezey of the Hawaiian Sugar Planters' Experiment Station, Honolulu, Hawaii. To Mr. Swezey should be credited most of the knowledge about the host plants of the species. Some live in the fronds and stems of ferns, some under bark, others in dead twigs, and at least one species mines in leaves. One species (from Samoa) was found on coconuts. In recent years information on the distribution of the species has increased, and now representatives of the genus are recorded from the Hawaiian and Marquesas Islands, from Samoa, and from Enderbury Island.

The anomalous nature of *Proterhinus* was recognized by early investigators of the group. In 1878 and 1879 Sharp,[2] working with the adults, concluded that they represented an aberrant type of Rhynchophora, the true position of which among the weevils was problematical. It was hoped that the present study of the larvae might bring to light evidence to show more clearly just where *Proterhinus* belongs among the weevils. This, however, has not been attained, the evidence gained from the larvae merely substantiating the belief that *Proterhinus* stands distinctly isolated from all other groups of Rhynchophora.

Among the more important characteristics that show the affinities between the larvae of *Proterhinus* and other Rhynchophora are:

[1] Böving, Adam G., and Craighead, F. C. An Illustrated Synopsis of the principal larval Forms of the Order Coleoptera. Ent. Amer., 11 (n. s.), 1931, 351 pp., 125 pls.

[2] Sharp, D. Descriptions of some new Species and a new Genus of rhynchophorous Coleoptera from the Hawaiian Islands. Ent. Soc. London, Trans., 1878, pp. 15-26.
Sharp, D. On some Coleoptera from the Hawaiian Islands. Ent. Soc. London, Trans., 1879, pp. 77-81.

absence of legs and urogomphi,[3] no molar part on mandible, absence of gular suture and gular area, presence of hypopharyngeal bracon, lack of hypopharyngeal sclerome, simple mala, and postmentum connected laterally with maxillary stipites. Other characteristics less definitive but present in the majority of weevil larvae are: three setae on postmentum, a seta and nearby sensory pore on inner margin of stipes just behind base of mala, and antenna with one article.

On the other hand, there are several characteristics by which *Proterhinus* larvae differ from those of other Rhynchophora. One of the more important of these is the location of the thoracic spiracle in the mesothorax instead of apparently intersegmentally between the prothorax and mesothorax as in the typical weevil larvae studied. The epipharyngeal rods are more primitive since they are represented by simple extensions from the postero-lateral margins of the labral sclerite instead of extending ventrally to the epipharyngeal membrane as in other rhynchophorous larvae, except *Belus*. In most weevil larvae there are one or two pairs of setae on the clypeus, but in *Proterhinus* these are absent.

Van Emden[4] has suggested that *Proterhinus* shows affinities with *Belus*. In the latter the head is deeply retracted, the frontal sutures are indistinct, and the body is hairy. *Proterhinus* agrees with *Belus* in these particulars but differs from it in having the thoracic spiracle clearly in the mesothorax (apparently intersegmental in *Belus*), the antenna with one article (two in *Belus*), the labrum and epipharynx sparsely setose (thickly in *Belus*), the maxillary palpus with two articles (three in *Belus*), and the spiracle with a dorsal air tube (simple in *Belus*). Moreover, in *Belus* the prementum and postmentum have numerous setae, only one pair and three pairs, respectively, being present in *Proterhinus*.

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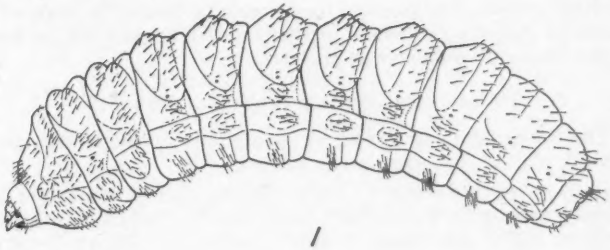
[3] There are weevil larvae with elaborate, corneous extensions from the ninth abdominal segment, but this condition is exceptional.

[4] Emden, Fritz Van. On the taxonomy of Rhynchophora larvae (Coleoptera). Roy. Ent. Soc. London, Trans., 87, 1, 1938, pp. 1-37, 108 figs.

Plate 1

Fig. 1. *Proterhinus swezeyi*. Larva, lateral view. X15.
Fig. 2. *Proterhinus longulus*. Clypeus and labrum. X85.
Fig. 3. *Proterhinus swezeyi*. Antenna. X225.
Fig. 4. *Proterhinus longulus*. Left thoracic spiracle. X325.
Fig. 5. *Proterhinus longulus*. Epipharynx. X85.
Fig. 6. *Proterhinus abnormis*. Left mandible, dorsal view. X70.
Fig. 7. *Proterhinus longulus*. Right mandible, dorsal view. X85.
Fig. 8. *Proterhinus longulus*. Head, dorsal view. X40.
Fig. 9. *Proterhinus longulus*. Head, lateral view. X40.
Fig. 10. *Proterhinus longulus*. Head, ventral view. X40.

Proc. Haw. Ent. Soc., Vol. XI, No. 1. Plate I



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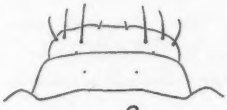

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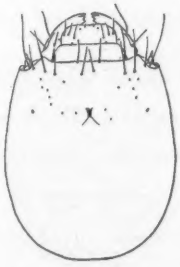

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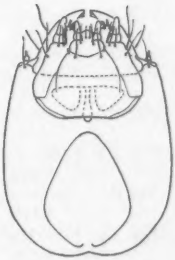

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PROTERHINUS

absence of legs and urogomphi,[3] no molar part on mandible, absence of gular suture and gular area, presence of hypopharyngeal bracon, lack of hypopharyngeal sclerome, simple mala, and postmentum connected laterally with maxillary stipites. Other characteristics less definitive but present in the majority of weevil larvae are: three setae on postmentum, a seta and nearby sensory pore on inner margin of stipes just behind base of mala, and antenna with one article.

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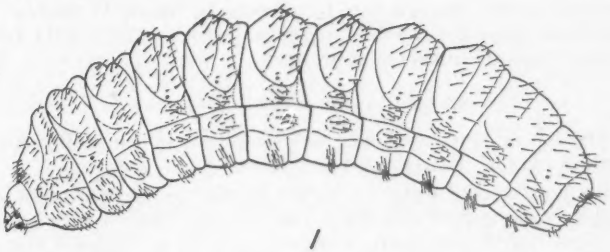

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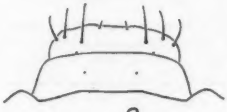

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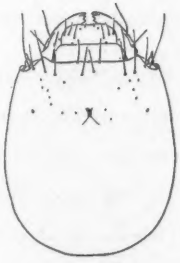

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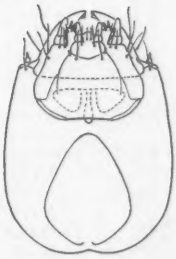

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PROTERHINUS

Before *Proterhinus* can be placed more definitely with relation to other weevils, intermediate forms must be found. A study of the larvae of *Aglycyderes* would, perhaps, prove helpful but the larvae of this genus are unknown at present.

GENERIC CHARACTERS OF LARVAE

The larvae of *Proterhinus,* as exemplified by the eleven species studied, may be characterized as follows:

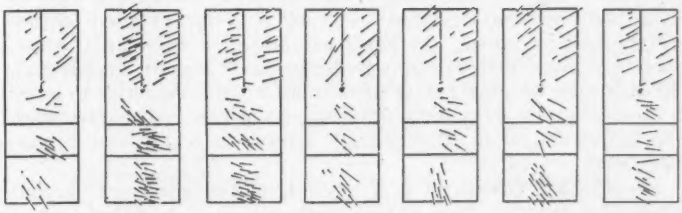
Body cylindrical (Fig. 1), legless, gently curved or straight, only slightly more robust anteriorly, and sparsely clothed with setae of medium length and short, colorless asperities. Entire larva uniformly white[5] with exception of head capsule and mandibles, which are colored as described below.

Head capsule (Figs. 8, 9, 10) broadly oval, slightly longer from posterior margin to base of clypeus than broad, widest at middle,

[5] Swezey reports that the living larva of *P. abnormis* is "yellowish when full grown and ready to pupate." Swezey, O. H. Notes on *Proterhinus abnormis,* a leaf-miner in leaves of *Broussaisia arguta.* Hawaii Ent. Soc. Proc., 4, (3), 1921, pp. 470-471, 1 fig.

Plate 2

Fig. 11. *Proterhinus abnormis.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 12. *Proterhinus dispar.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 13. *Proterhinus subplanatus.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 14. *Proterhinus epitretus.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 15. *Proterhinus swezeyi.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 16. *Proterhinus xanthoxyli.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 17. *Proterhinus longulus.* Setae of typical abdominal segment, semidiagrammatic.
Fig. 18. *Proterhinus dispar.* Epipharynx. X120.
Fig. 19. *Proterhinus abnormis.* Distal half of right maxilla, dorsal view. X160.
Fig. 20. *Proterhinus epitretus.* Epipharynx. X80.
Fig. 21. *Proterhinus dispar.* Distal half of right maxilla, dorsal view. X145.
Fig. 22. *Proterhinus subplanatus.* Distal half of right maxilla, dorsal view. X145.
Fig. 23. *Proterhinus epitretus.* Distal half of right maxilla, dorsal view. X125.
Fig. 24. *Proterhinus swezeyi.* Distal half of right maxilla, dorsal view. X115.
Fig. 25. *Proterhinus longulus.* Distal half of right maxilla, dorsal view. X115.
Fig. 26. *Proterhinus abnormis.* Labium and maxillae, ventral view. X125.
Fig. 26A. *Proterhinus abnormis.* Second article of labial palpus. X285.
Fig. 27. *Proterhinus xanthoxyli.* Distal half of right maxilla, dorsal view. X125.



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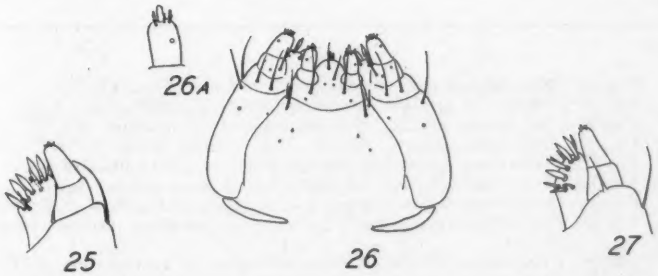

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PROTERHINUS

and about twice as long as thick. Epicranial and frontal sutures not developed. Hypopharyngeal bracon present, tentorial bridge in same plane as ventral surface of head. Anterior, exposed portion of epicranium brown, the retracted posterior two-thirds white. Anterior dorsal margin strongly declivous to base of clypeus and, on each side, with eight setae of medium length. Posterior to latter a group of very short setae differing in position and number with the individual larva. Immediately ventral to ocellus one prominent seta.

Clypeus and labrum (Fig. 2) well developed and free. Clypeus more than twice as wide as long, without setae but with a pair of sensilla. Labrum twice as wide as long, with four setae on each side, the anterior one short, the posterior three of medium length.

Epipharynx (Fig. 5) membranous, with six setae on each side; three antero-laterals, two antero-medians and one epipharyngeal seta.[6] Epipharyngeal rods extending backward from the inner, latero-posterior margins of labral sclerite and varying slightly in shape between species (cf. Figs. 18 and 20).

One ocellus with convex lens on ventral antero-lateral angle of head, immediately below antenna. Antenna (Fig. 3) with one article, connected to head by a basal membrane, with three setae laterally and terminally with a prominent cone-shaped sensillum subequal in length to article. Article produced into two apodemes, within the head, to at least one of which a muscle is attached.

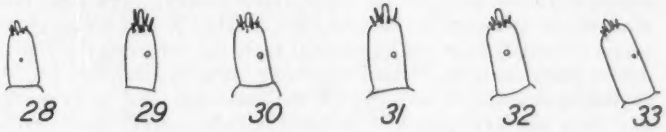
Mandible brown, with two teeth (Fig. 7) but with a lamellate projection from dorsal tooth or one from each tooth (Fig. 6), giving mandible the appearance of having three or four teeth. Mandible externally with two well-developed setae.

Maxilla (Fig. 36) with transversely directed, comparatively long, slender cardo, rectangular stipes, and truncate mala. Cardo without setae. Stipes with four setae arising near base of palpus

[6] The naming of these setae is in accord with the terms applied by Van Emden, l. c., p. 3.

Plate 3

Fig. 28. *Proterhinus dispar.* Second article of labial palpus. X175.
Fig. 29. *Proterhinus subplanatus.* Second article of labial palpus. X285.
Fig. 30. *Proterhinus epitretus.* Second article of labial palpus. X235.
Fig. 31. *Proterhinus swezeyi.* Second article of labial palpus. X235.
Fig. 32. *Proterhinus xanthoxyli.* Second article of labial palpus. X260.
Fig. 33. *Proterhinus longulus.* Second article of labial palpus. X235.
Fig. 34. *Proterhinus dispar.* Labium and maxillae, ventral view, X80.
Fig. 35. *Proterhinus subplanatus.* Labium and maxillae, ventral view. X115.
Fig. 36. *Proterhinus epitretus.* Labium and maxillae, ventral view. X115.
Fig. 37. *Proterhinus swezeyi.* Labium and maxillae, ventral view. X80.
Fig. 38. *Proterhinus xanthoxyli.* Labium and maxillae, ventral view. X115.
Fig. 39. *Proterhinus longulus.* Labium and maxillae, ventral view, X85.



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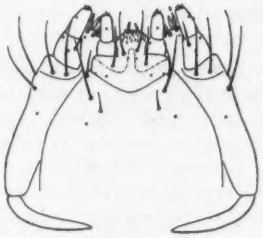

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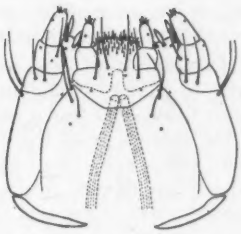

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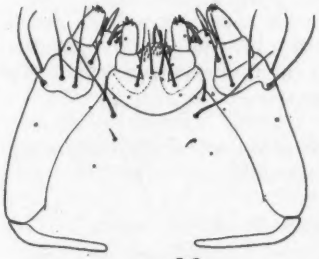

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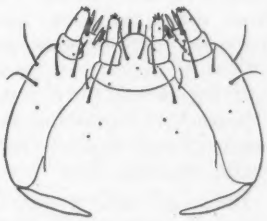

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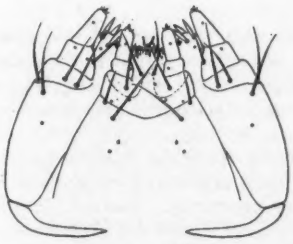

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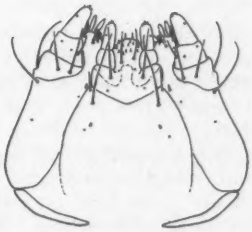

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PROTERHINUS

and one minute seta and accompanying sensory pore near inner margin just proximal to base of mala. Mala broad, bearing eleven setae, of which four are on ventral face, the remainder along the dorsal inner margin. Palpus with two articles, basal one broader than long and on its ventral face with one seta near inner margin and two sensory pores. Terminal article longer than broad, bluntly conical, bearing one sensory pore on ventral face; apex with about seven sensilla, one distinctly broader than others. Dorsal surface of maxilla near base of palpus with (Fig. 22) or without (Fig. 24) long, slender spinules.

Labium (Fig. 36) with prementum free, postmentum united with maxillae. Postmentum without pigmented area but each side with three setae and a sensory pore, the most posterior seta (hereafter spoken of as third seta on postmentum) varying in length with the species or groups of species. Prementum with an indistinctly pigmented, transverse basal sclerite with indefinite anterior margin. One seta immediately behind palpus and a pair of sensory pores between bases of palpi. Ligula indistinctly separated from prementum, with a pair of setae near base and with two pairs of slender setae terminally. Surface of ligula with or without asperities. Palpus with two articles, each with a sensory pore. Terminal article (Fig. 29) with about six sensilla arising from the blunt apex, one distinctly broader and longer than remainder and varying specifically in proportionate length with article.

Hypopharynx membranous.

Spiracles (Fig. 4) on mesothorax and on first eight abdominal segments subequal in size, the thoracic slightly larger; each with single, oval air tube.

Prothorax with tergum indistinctly divided into two transverse areas, prescutum and scutoscutellum. Prescutum with setae of medium length, scutoscutellum with sparsely set setae in a transverse band and with dense short asperities on posterior half. Pedal lobe not prominent, rather densely set with setae of varying lengths. Sternum setose.

Mesothorax and metathorax identical except for lack of functional spiracle on metathorax. Each with three tergal folds. Lateroterga and pleura indistinctly developed, each with setae. Pedal lobes not prominent, with setae of various lengths. Sterna with setae.

First six abdominal segments nearly identical in size and in number and arrangement of setae. Each segment feebly divided, dorsally, into four transverse areas: prescutum, scutum, scutellum, and postscutellum. Setae on prescutum and scutellum varying in number with the species. One short seta always present immediately above spiracle. Latero-tergal and pleural lobes

indistinctly developed, setose. Sternum feebly divided into eusternum and sternellum, setae on the former varying in number with the species.

Seventh abdominal segment divided into only two tergal folds, eighth undivided. Each with approximately the same number of setae, slightly fewer than on anterior segments.

Ninth much shorter than preceding abdominal segments, tapering and bearing an incomplete band of setae but without other armature. Tenth abdominal segment reduced to one dorsal and two ventro-lateral lobes around anus.

Proterhinus abnormis Perkins. Figures: 6, 11, 19, 26, 26A.

Mandible with lamellate projection from each tooth. Third seta on postmentum minute. Ligula without asperities. Labial palpus with second article short and with principal terminal sensillum about one-third length of article. Maxilla, dorsally, at base of palpus, with two spinules of medium length. Prescutum of typical abdominal segment, on each side, with about five setae, scutellum with about six setae, eusternum with about seven setae. Anterior abdominal segments with dorsal ampullae.

Material: 17 larvae "leaf miner in *Broussaisia,* Mt. Kaala, 3500 ft., Oahu, Feb. 11, 1928 (O. H. Swezey)".

Proterhinus phyllobius Perkins.

Although larvae, associated with reared adults determined as *P. phyllobius* Perkins, were studied carefully, no differences were found to distinguish them from the larvae of *abnormis.* The description of the latter will apply, therefore, to *phyllobius.*

Material: 5 larvae "leaf miner in *Broussaisia,* Kaumuahona, Oahu, Feb. 1928 (O. H. Swezey)"; 6 larvae "ex *Broussaisia,* Haula, Oahu, 1-6-34 (O. H. Swezey)."

Proterhinus dispar Sharp. Figures: 12, 18, 21, 28, 34.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum of medium length. Labial palpus with second article slender and with terminal sensillum about one-fifth length of second article. Ligula with numerous asperities. Maxilla, dorsally, with three spinules of medium length. Prescutum of typical abdominal segment, on each side, with about nineteen setae, scutellum with about twelve setae, eusternum with about eighteen setae. Abdomen without dorsal ampullae.

Material: 12 larvae "ex *Wikstroemia foetida,* Lanihuli, Oahu, 9-16-28 (O.H.S.)"; 5 larvae "in bark of dead *Wikstroemia,* Pauoa Flats, Oahu, 4-23-34 (O. H. S.)".

Proterhinus subplanatus Perkins. Figures: 13, 22, 29, 35.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum long. Labial palpus with second article slender and

with principal terminal sensillum about one-fourth length of article. Ligula with many long asperities. Maxilla, dorsally, with six or more long spinules. Prescutum of typical abdominal segment, on each side, with about thirteen setae, scutellum with about eleven setae, eusternum with about eighteen setae. Abdomen without dorsal ampullae.

Material: 10 larvae "ex *Straussia,* Marsh Trail, Oahu, 12-30-33 (O. H. Swezey)".

Proterhinus anthracias Perkins.

No specific differences could be found between larvae of this species and *P. subplanatus.*

Material: 3 larvae "Dead bark of *Straussia,* Halemanu, Kauai, Mar. 9, 1928 (O. H. Swezey)".

Proterhinus epitretus Perkins. Figures: 14, 20, 23, 30, 36.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum of medium length. Principal terminal sensillum of labial palpus about one-fourth length of second article. Ligula densely set with asperities. Maxilla, dorsally, with a single spinule. Prescutum of typical abdominal segment, on each side, with about seven setae, scutellum with about six setae, eusternum with about nine setae. Abdomen without dorsal ampullae.

Material: 3 larvae "ex *Cibotium.*"

Proterhinus obscurus perobscurus Perkins.

Larvae associated with reared adults of this species have been studied but no characters of a specific nature have been found to separate them from the larvae of *P. epitretus.*

Material: 15 larvae "ex *Perrottetia,* Mt. Tantalus, Oahu, 9-8-29 (O. H. S.)".

Proterhinus swezeyi Perkins. Figures: 1, 3, 15, 24, 31, 37.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum minute. Principal terminal sensillum of labial palpus about one-fourth length of second article. Ligula without asperities. Maxilla, dorsally, without spinules. Prescutum of typical abdominal segment, on each side, with about seven setae, scutellum with about nine setae, eusternum with about ten setae. Abdomen without dorsal ampullae.

Material: 3 larvae "ex pith of dead twigs of *Broussaisia,* Mt. Kaala, 3500 ft., Oahu, Feb. 11, 1928 (Swezey)".

Proterhinus xanthoxyli Perkins. Figures: 16, 27, 32, 38.

Mandible with lamellate projection from dorsal tooth. Third seta on postmentum minute. Labial palpus with principal terminal sensillum about one-fourth length of second article. Ligula densely set with asperities. Maxilla, dorsally, with a single

spinule. Prescutum of typical abdominal segment, on each side, with about nine setae, scutellum with about seven setae, eusternum with about fourteen setae. Abdomen without dorsal ampullae.

Material: 3 larvae "ex *Xanthoxylum,* Palikea, Waianae Mts., Oahu, Feb. 3, 1935 (O. H. Swezey)".

Proterhinus longulus Sharp. Figures: 2, 4, 5, 7, 8, 9, 10, 17, 25, 33, 39.

Dorsal tooth of mandible with lamellate projection. Third seta on postmentum minute. Labial palpus with second article slender and with principal terminal sensillum short, about one-sixth length of article. Ligula with few asperities. Maxilla, dorsally, with a single spinule. Prescutum of typical abdominal segment, on each side, with about eight setae, scutellum with about seven setae, eusternum with about nine setae. Abdomen without dorsal ampullae.

Material: 3 larvae "ex *Phegopteris polycarpa,* Puu Kalena, Oahu, 9-11-32 (O. H. S.)".

Proterhinus excrucians Perkins.

Larvae associated with reared adults of this species have been examined but no characters have been found to separate them from larvae of *P. longulus.*

Material: 10 larvae "ex *Gouldia,* Mt. Olympus, Oahu, 3-31-35 (O. H. S.)".

Thysanoptera and Aphididae new to the Island of Midway

BY FRED A. BIANCHI
H.S.P.A. Experiment Station

(Presented at the meeting of July 8, 1940)

Bryan's list of the insects of Midway (Bishop Museum Bulletin No. 31, 1926) includes only *Aphis medicaginis* Koch among the Aphididae and only one species, unidentified, among the Thysanoptera. The present writer, recently returned from the third of three short successive yearly visits to that island, is now able to add to the fauna of Midway one more species of Aphis with an associated parasite, and four identified species of Thysanoptera. Following is a list of these insects with some pertinent notes. Mr. C. E. Pemberton has kindly identified the Aphididae and *Lysiphlebus;* the writer himself, the Thysanoptera.

Aphis medicaginis Koch:—Listed by Bryan in 1926, is still to be found in Midway and was collected by the writer from the flower heads and foliage of isolated and apparently accidentally grown clumps of alfalfa.

Aphis gossypii Glover:—Excessively abundant on French marigolds; upon which host the large colonies are parasitized to a considerable extent by the braconid *Lysiphlebus testaceipes* (Cresson).

Chirothrips mexicanus Crawford:—Much more abundant in Midway than in the windward islands of our group, this species is probably the "Thrips" listed by Bryan. It was found by the present writer forming large colonies in both *Eragrostis variabilis* Gaud. and *Ammophila arenaria* Link. Mention of the latter, a sand-binding sedge introduced into Midway during the first years of the present century, constitutes a new host record for *Chirothrips mexicanus.*

Haplothrips gowdeyi (Franklin):—Found in large numbers in all stages on the flower heads of *Eragrotis variabilis,* but possibly of recent introduction, for it had not been seen by the writer previous to May of this year and could easily have entered Midway with hosts of later arrival than *Eragrostis.*

Thrips hawaiiensis (Morgan):—This, the most common thrips of the windward islands, is also found in Midway, but not in abundance. Scattered specimens were collected from flowers of alfalfa and *Leucaena glauca* (Linn.) Bentham.

Thrips tabaci Lind.:—This ubiquitous insect is abundant in Midway, causing considerable damage to carnations, stocks, other flowers, and onions.

Two Thrips New to Hawaii

BY FRED A. BIANCHI
H.S.P.A. Experiment Station

(Presented at the meeting of December 9, 1940)

The presence in the Territory of *Bregmatothrips venustus* Hood and of *Dendrothripoides ipomeae* Bagnall is here recorded for the first time.

Bregmatothrips venustus is a grass feeding species of wide distribution in North America and was first described as a new species and genus in 1912 (Hood. New Genera and Species of North American Thysanoptera from the South and West. Proc. Biol. Soc. Wash.; Vol. XXV, Page 61). Its discovery in Hawaii adds a new species, genus, and sub-family, the Belothripinae, to our thrips fauna, and it should have been recorded earlier, for it was made by the writer at Waipahu, Oahu, on April 29, 1939, and was discussed at the following meeting of the Entomological Society. Through some oversight the proper note failed to reach the printed pages of our "Proceedings" at the time. The thrips is rather common, but by no means abundant, on *Echinochloa crus-galli* at Waipahu.

Dendrothripoides ipomeae, of Karny's sub-family Sericothripinae, is here mentioned for the first time as a component of the Hawaiian fauna. As its name indicates, it is a species whose usual hosts appear to be species of *Ipomoea.* Originally described from *I. staphylina* in India (Bagnall. Ann. Mag. Nat. Hist., Ser. 9, Vol. XII, Page 624, 1923), it is also recorded as numerous on *I. batatas* in Brazil (Moulton. The Thysanoptera of South America. Rev. de Entomologia; Vol. III, Fasc. 1, Page 96; March, 1933). In Hawaii, however, *Dendrothripoides* is not yet known from any *Ipomoea* and only a single specimen was found by the writer on *Echinochloa crus-galli* at Kailua, Oahu, on March 13 of the present year.

For the determination of *Bregmatothrips venustus* I am indebted to Professor J. Douglas Hood. I am myself responsible for the identification of the second species.

Remarkable Longevity of a Pyrophorus Larva

BY FRED A. BIANCHI
H.S.P.A. Experiment Station

(Presented at the meeting of December 9, 1940)

Though many species of Elateridae are known to have long larval lives and the individuals of most species that have been studied are said to exhibit a wide range of variation in this respect,

it appears of some interest and possible use to record a case of unusual longevity observed by the writer in a larva of *Pyrophorus bellamyi* Van Zwal. This species was discovered by Dr. F. X. Williams and the writer in Guatemala and was by them introduced into Hawaii during 1934-35, so that it stands a chance of becoming established and eventually attaining economic importance among us.

The larva referred to was hatched on the 1st of June, 1934, from an egg laid in our field laboratory in Guatemala and was last seen on November 6 of the present year. It is known, therefore, to have lived 7 years, 5 months, and 6 days before it escaped from the tin pill-box, in which it was reared, and became lost. During the first year and a half of its life it was fed and otherwise treated in exactly the same manner as other larvae hatched from the same batch of eggs, and it gave no indication that its development into the adult form would be abnormally delayed. For this reason no record was made of the number of moults it may have undergone during the first part of its life. Later, beginning with what was probably the eighth moult, a closely approximate record was obtained which showed the occurrence of 13 more moults separated from each other by stadia which, without apparent reason, varied in the following sequence: 52, 111, 20, 111, 227, 76, 245, 108, 161, 79, 172, and 244 days. Beginning with the 6th recorded moult, which occurred when the larva was 2 years, 5 months, and 17 days old and was probably the 14th in its whole life, careful micrometric measurements showed progressive growth of the head capsule up to the 16th ecdysis, no change between the 16th and 17th, and a gradual and small shrinkage from the 17th to the 19th, with the last two exuviae showing no change from the 19th. These measurements are in accordance with the observations of other workers who have noticed body shrinkage in abnormally long lived larvae of other species of Elateridae.

Though it demonstrated the power characteristic of its species somewhat less frequently than other larvae reared under observation, our long lived individual evidently retained the latent ability to produce light throughout its life, for it was last seen strongly luminescent on June 19th of the present year. It illustrated the high biotic potential of *P. bellamyi* by showing no distress whatsoever either when starved for as long as 4 months at a time or when subjected for prolonged periods to the wide range of humidities comprised between the humidity of an ordinary room and that of a tightly closed tin-can partly filled with semi-liquid mud.

A Check List of the Parasitic Hymenoptera of the Samoan Islands with Descriptions of New Species Appended

BY DAVID T. FULLAWAY
Entomologist, Board of Agriculture and Forestry

(Presented at the meeting of December 9, 1940)

EVANIIDAE

Evania affinis LeGuillou, Ann. Soc. Ent. Fr. 1841, p. 511. Listed in Bishop Museum Catalogue.

Evania sericea Cam., Tr. Ent. Soc. London, 1883, p. 191. Well-known cockroach egg-parasite. Bishop Museum Collection.

ICHNEUMONIDAE

Echthromorpha samoana Full., Proc. H.E.S., X, (1), p. 50, 1938. Bishop Museum Collection.

Paniscus samoanus Kohl, Denkschr. Math. Naturw. Kl. K. Akad. Wien, 1907, LXXXI, p. 314, no. 38. Bishop Museum Collection.

Henicospilus nocturnus Kohl, ibid. p. 315. Bishop Museum Collection.

Henicospilus expeditus Kohl, ibid. Bishop Museum Collection.

Henicospilus samoana Kohl, ibid. Bishop Museum Collection.

Eugalta samoana Full., Proc. H.E.S., X, (1), p. 52, 1938. Bishop Museum Collection.

Hemiteles samoanus Full., ibid. X, (3), p. 399, 1940. Bishop Museum Collection.

Ichneumon samoanus Full. ibid. X, (1), p. 49, 1938. Bishop Museum Collection.

Therion savaiiensis Full., ibid. X, (3), p. 400, 1940. Bishop Museum Collection.

Porizon savaiiensis Full., ibid. X, (3), p. 401, 1940. Bishop Museum Collection.

Habronyx sp. Bishop Museum Collection.

Ephialtes sp. Bishop Museum Collection.

Amorphota sp. Bishop Museum Collection.

Mesochorus sp., ex leaf-roller on *Homalanthus,* reared by Swezey, 1940.

Mesochorus sp., ex *Pachyrhabda amianta* on *Asplenium nidus,* reared by Swezey, 1940.

Diplazon laetatorius (Fabr.), Spec. Ins., 1, p. 424, no. 26, 1781, ex syrphid puparium (Swezey), 1940.

Campoplex (Dioctes) tutuilensis Full., Proc. H.E.S., X, (3), p. 402, 1940. Bishop Museum Collection.

BRACONIDAE

Aneurobracon samoanus Full., (see p. 45 below). Reared from lepidopterous larvae by Swezey, 1940.

Zele filicornis Cam., Jn. Str. Asiat. Soc., XXXIX, p. 128, 1903. Bishop Museum Collection.

Apanteles expulsus Turner, Tr. Ent. Soc. London, 1918, p. 346, Attacks larvae of *Cirphis unipuncta* and *Anticarsia irrorata;* reared by Swezey from a Plusia-like caterpillar on *Ipomoea pes-caprae;* also from caterpillar of *Azazia rubricans* on *Vigna marina.*

Apanteles hyblaeae Wilk., Bull. Ent. Res., XIX, p. 114, 1928. Reared by Buxton from the Noctuid *Hyblaea sanguinea;* by Swezey from *Pachyrhabda amianta* on *Asplenium nidus.*

Apanteles samoanus Full., Proc. H.E.S., X, (3), p. 402, 1940. Reared by Swezey from caterpillars of *Marasmia trapezalis* on *Miscanthus japonicus* and *Marasmia trebiusalis* on *Oplismenus compositus.*

Apanteles agonoxenae Full., (see p. 48 below). Reared by Swezey from *Agonoxena argaula* caterpillars on *Clinostigma oncorhyncha,* 1940.

Apanteles bedelliae Full., ibid. p. 46. Reared by Swezey from leaf-miners in sweet potatoes, yam, and *Desmodium umbellatum,* 1940.

Apanteles operculinae Full., ibid. p. 47. Reared by Swezey from leaf-miners in yam and *Operculina turpethum,* 1940.

Apanteles operculinae var. **polita** Full., ibid. p. 47. Reared by Swezey from caterpillar of a Hesperid on rattan, 1940.

Apanteles upoluensis Full., ibid. p. 48. Reared by Swezey from leaf-rolling caterpillar on *Ficus* sp. 1940.

Apanteles afiamaluana Full., ibid. p. 49. Reared by Swezey from lepidopterous leaf-miner, host (?), 1940.

Microdus hawaiicola Ashm., Fauna Hawaiiensis, I, (3), p. 361, 1901. Parasite of *Opogona.* Bishop Museum Collection.

Microdus tautirae Cheesman, Ann. Mag. N.H., 10, (1), p. 186, 1928.

Chelonus vitiensis Turner, Tr. Ent. Soc. London, 1918, p. 345. Reared by Swezey from *Sylepta sabinusalis* on *Cypholophus macrocephalus,* 1940.

Phanerotoma samoana Full., Proc. H.E.S., X, (3), p. 403, 1940 Bishop Museum Collection.

Spathius tutuilensis Full., ibid., p. 404, Bishop Museum Collection.

Doryctes samoanus Full., ibid, p. 405, Bishop Museum Collection.

Microbracon sp. Reared by Swezey from a leaf-miner in wild cucumber leaves, 1940.

Camptocentrus sp. Reared by Swezey from a larva in fruits of Trema-like tree, 1940.
Glyptomorpha sp. Reared by Swezey from a leaf-miner in *Macaranga* leaves, 1940.

CHALCIDIDAE

Chalcis samoana Full., Proc. H.E.S., X, (3), p. 405, 1940. Bishop Museum Collection.
Chalcis sp. Reared by Swezey from a pupa ex *Wedelia biflora*, 1940.
Stomatoceras samoana Full., Proc. H.E.S., X, (3), p. 407, 1940. Bishop Museum Collection.

AGAONIDAE

Blastophaga spp. Reared by Swezey ex large figs, 1940.
Pleistodontes sp. Reared by Swezey ex small figs, 1940.

EUCHARIDAE

Chalcura samoana Full., Proc. H.E.S., X, (3), p. 408, 1940. Bishop Museum Collection.
Stibulaspis samoana Full., ibid., p. 409. Bishop Museum Collection.

TORYMIDAE

Megastigmus sp. Bishop Mus. Collection.
Lochites sp. Bishop Museum Collection.
Sycoscapter sp. Reared by Swezey ex large figs, 1940.

ENCYRTIDAE

Encyrtus infelix (Embleton), Tr. Ent. Soc. London, 1902, p. 223, Bishop Museum Collection.
Microterys sp. Bishop Museum Collection.
Acerophagus sp. Bishop Museum Collection.
Psyllaphagus sp. Reared by Swezey from a psyllid, *Mesohomotoma hibisci* on hau, *Hibiscus tiliaceus*, 1940.
Echthrogonatopus exitiosus Perk., H.S.P.A. Exp. Sta. Bul. 1, (8), Div. Ent., p. 256, 1906. Reared by Swezey from dryinid cocoon on taro, 1940.

EUPELMIDAE

Eutrichosoma sp. Bishop Museum Collection.
Charitops sp. Bishop Museum Collection.
Eupelmus sp. Bishop Museum Collection.
Metapelma sp. Bishop Museum Collection.

PTEROMALIDAE

Panstenon sp. Reared by Swezey from agromyzid leaf-miner in Job's tears, 1940.
Micromelus sp. Bishop Museum Collection.
Pteromalus sp. Bishop Museum Collection.
Stenomesius sp. Bishop Museum Collection.
Sympiesis sp. Hyperparasite ex *Homalanthus* leafroller. Reared by Swezey, 1940.
Pediobius sp. Reared by Swezey ex leaf-miner in *Premna taitensis,* 1940.
Chrysocharis sp. Reared by Swezey ex leaf-miner in *Morinda citrifolia,* 1940.

EULOPHIDAE

Spalangia hirta Haliday, Ent. Mag., 1, p. 334, 1876. Buxton Researches in Polynesia and Melanesia, p. 57, 1927.
Spalangia sp. Bishop Museum Collection.
Tetrastichus sp. Collected by Swezey and Wilder at Tuaefu, 1923.
Tetrastichus sp. Reared by Swezey ex leaf-miner in hau (*Hibiscus tiliaceus*), 1940.
Tetrastichus sp. Reared by Swezey ex *Pachyrhabda antinoma* on Polypodium-like fern, 1940.
Tetrastichus sp. Reared by Swezey ex abundant leaf-miner (*Acrocercops* sp.) host (?), 1940.
Tetrastichus sp. Reared by Swezey ex Agromyzid.
Ootetrastichus beatus Perk., H.S.P.A. Exp. Sta. Bul., 1, (8), Div. Ent., p. 263, 1906. Reared by Swezey from eggs of *Perkinsiella vitiensis* in sugar cane, 1940.
Horismenus sp. Reared by Swezey ex leaf-miner in *Macaranga,* 1940.
Euplectrus sp. Reared by Swezey ex *Prodenia litura* caterpillars on taro, 1940.
Elachertus sp. Bishop Museum Collection.
Notanisomorpha sp. Reared by Swezey ex leaf-miner (*Phytomyza spicata*) in Job's tears, 1940.
Melittobiopsis ereunetiphila Timb., Proc. H.E.S., VI, (2), p. 319, 1926. Reared by Swezey from *Decadarchis* larvae in old cacao pod, 1940.
Chrysocharis sp. Reared by Swezey ex agromyzid, host (?), 1940.

MYMARIDAE

Anagrus sp. Parasite of leaf-hoppers ?
Polynema sp.
Paranagrus optabilis Perk., H.S.P.A., Exp. Sta. Bul., 1, (6), Div. Ent. p. 199, 1905, ex *Perkinsiella vitiensis* eggs, Swezey, 1940.

ELASMIDAE

Elasmus sp. Reared by Swezey ex leaf-miner in *Morinda citrifolia,* 1940.

PROCTOTRUPIDAE

Caloteleia savaiiensis Full., Proc. H.E.S., X, (2), p. 209, 1939. Bishop Museum Collection.

Caloteleia bryani Full., ibid., p. 210. Bishop Museum Collection.

Caloteleia upoluensis Full., ibid., p. 210. Bishop Museum Collection.

Caloteleia nigra Full., ibid., p. 211. Bishop Museum Collection.

Caloteleia swezeyi Full., ibid., p. 212. Bishop Museum Collection.

Caloteleia wilderi Full., ibid., p. 212. Bishop Museum Collection.

Caloteleia melanocephala Full., ibid., p. 213. Bishop Museum Collection.

Macroteleia tutuilana Full., ibid., p. 214. Bishop Museum Collection.

Macroteleia bryani Full., ibid., p. 215. Bishop Museum Collection.

Macroteleia upoluensis Full., ibid., p. 216. Bishop Museum Collection.

Opisthacantha wilderi Full., ibid., p. 217. Bishop Museum Collection.

Cremastobaeus samoanus Full., ibid., p. 217. Bishop Museum Collection.

Sparasion savaiiensis Full., ibid., p. 218. Bishop Museum Collection.

Pentacantha wilderi Full., ibid., p. 219. Bishop Museum Collection.

Telenomus upoluensis Full., ibid., p. 219. Bishop Museum Collection.

Leptacis upoluensis Full., ibid., p. 220. Bishop Museum Collection.

Trichopria savaiiensis Full., ibid., p. 220. Bishop Museum Collection.

DRYINIDAE

Haplogonatopus vitiensis Perk., H.S.P.A. Exp. Sta. Bul. 1, (10), p. 488, 1906. Reared by Swezey ex taro leaf-hopper *Megamelus proserpina,* 1940.

CYNIPIDAE

Eucoila sp. Reared by Swezey ex agromyzid leaf-miner in *iVedelia triflora,* 1940.

Aneurobracon samoanus n. sp.

Female. Length 3.5 mms.; hind leg 5.25 mms. Black, the fore and middle legs and the trochanters together with apex of coxae and base of femur of long hind legs, the palpi, and the pedicel of the antennae brownish; wings hyaline, the stigma and metacarp piceous, the few other veins pale testaceous.

Head generally smooth and shining, face and genae finely, indeed microscopically, punctuate and sparsely clothed with silvery hairs, vertex and occiput microscopically reticulate. Thorax has the mesonotum smooth and shining with microscopic punctuation as on head and fine hairy clothing, scutellum almost bare and microscopically reticulate, propodeum dull with extremely fine microscopic rugosity except in the middle where there is an elongate areola rather more coarsely sculptured, mesopleura and pleural area of the prothorax behind finely punctuate and hairy, the sides of the propodeum finely shagreened. Abdomen shining above and smooth, except the first segment, which is striate basally and to the middle, beyond that microscopically reticulate; this segment being more than twice as long as it is wide, while the following segments are not proportionately so long, the second quadrate or nearly so; ovipositor is a pale straw yellow and as long as the abdomen, the valves black and hairy. Hind coxae stout, elongate and narrowed apically, more than half the length of the thorax; trochanters thin, cylindrical, two-thirds as long as the coxae; femora perhaps a half longer but tibiae and tarsi together longer than the three proximal parts of the leg and clothed with bristly hairs, the longer spur of the tibiae two-thirds the length of the first tarsal segment, which is nearly half as long as the tibiae. Wings clothed with short, fine hairs. Male in a general way similar.

Described from 6 female and 1 male specimens (type, allotype and paratypes) reared from lepidopterous larvae in Samoa by O. H. Swezey, as follows: 3 females (one of which is labelled type), Afiamalu, Upolu, 2200 ft., ex leaf roller VI-9-40; 2 females, Tapatapao, Upolu, 800-1000 ft., ex leaf-miner in yam, VII-20-40; 1 female, Pago Pago, Tutuila, VIII-13-40 ex leaf-miner; 1 male (allotype), Fagatogo, Tutuila, VIII-3-40, ex leaf-miner in *Operculina.*

The specimens have been examined by Prof. Brues and compared with examples of his *Aneurobracon bequaerti* with the following comments: "The legs are shorter and also the spurs on the hind tibiae are not so long. The cell in the hind wing is perhaps stronger in your species but it is not very noticeable in either one. The stigma is wider and more swollen."

Apanteles bedelliae n. sp.

Female. 1.75 mms. long, black, the tibiae, tarsi and femora apically of fore and middle legs, tibiae and tarsi basally and apical four tarsal joints of the hind legs reddish brown; antennae, tegulae, parts of legs not specified above and ovipositor sheaths black also. Head mostly finely rugose, face exceedingly finely indistinctly punctate (degree 1); mesonotum closely and finely punctate (degree 3); disc of scutellum impunctate, smooth and shining; propodeon rugose but not dull, areola and costulae distinct and moderately strong, former open at extreme base; wings with 1st abscissa of the radius longer than the transverse cubital, which it joins at an angle, the latter a little thicker and about as long as width of stigma, longer than the recurrent nervure, which is about twice the length of the upper portion of the basal but not as long as the apical portion of the 1st cubital plus pigmented portion of 2nd, stigma and metacarp of about equal length. Legs with hind coxae on the outer face finely punctate (degree 1), the longer hind tibial spur about one-fourth, the shorter about one-fifth the length of the basal joint of the tarsus. Abdomen with 1st tergite longer than wide by nearly a half, apically

truncate, basally depressed and having a median smooth concavity, the surface otherwise rugose, lateral margins somewhat convex and bowed outwardly, apical margin concave and bowed inwardly, apical length less than basal; 2nd tergite transverse basally with a knob or nipple-like extension into apical margin of 1st, apically spread fan-shape, the wings filling the angles, surface entirely smooth, as is also the surface of the following tergites, ovipositor sheaths as long as the hind basitarsus, going about three in the length of the abdomen.

Described from one female (type) reared from a leaf-miner (*Bedellia* sp.) in sweet potatoes collected at Tapatapao, Upolu, VII-23-40 at 800-1000 ft. elevation by O. H. Swezey. A male reared from a larva on yam collected at Vaialua, Upolu, VII-28-40 and one reared from a leaf-miner in *Desmodium umbellatum* collected on Goat Island, Tutuila, VIII-24-40 are probably this species.

Apanteles operculinae n. sp.

Male and female. 1.75 mms. in length, black, legs with the exception of the coxae, which are shining black, together with the proximal half of the antennae reddish brown. Head with the face, vertex and occiput finely punctate (degree 1). Thorax: mesonotum with closely spaced punctation anteriorly, less closely spaced punctation posteriorly (degree 3), disc of scutellum smooth and shining, with a few coarse punctures on the sides near the base (degree 5), propodeum without areola or costulae or median longitudinal carina, faintly rugose but shining. Wings: 1st abscissa of the radius hardly longer than the transverse cubitus, which it joins at an angle, a little longer than the recurrent nervure and hardly exceeding width of stigma, apical portion of 1st cubitus plus pigmented portion of 2nd about equalling the transverse cubitus and definitely longer than the upper portion of the basal; stigma shorter than the metacarp. Legs: hind coxae smooth and shining; long hind tibial spur about one-third, short spur about one-fourth length basal tarsal joint. Abdomen: 1st tergite a little longer than wide at base, planes of the basal square portion and apical triangular portion almost at right angles, both fairly flat, smooth and shining, 2nd tergite very narrow in the middle basally and spreading out apically to a flat fan-shaped disc, width less than twice the length, wings angulate, following tergites smooth and shining, really polished; ovipositor about one-half as long as abdomen, a little longer than basal joint of tarsus.

Described from one female (type) and four males reared from a lepidopterous leaf-miner in yams collected at Tapatapao, Upolu 800-1000 ft. elev., VII-20-40; and two females and one male reared from a lepidopterous leaf-miner in *Operculina turpethum* collected at Fagatogo, Tutuila VIII-3-40 by O. H. Swezey (allotype and paratypes).

Apanteles operculinae var. **polita** n. var.

Male. Similar to preceding but more highly polished and shining, even the front and middle coxae, likewise tegulae and lateral margins of tergites 1-3 reddish brown while the antennae are black throughout, punctation on face degree 2, on mesonotum degree 1, surface well covered with appressed silvery hairs, scutellum more convex and highly polished than usual and with lateral wings apically; propodeum perfectly smooth on the disc. Wings: 1st

abscissa of the radius thicker and longer than the transverse cubital, which it joins at a well marked angle, recurrent nervure about same length as transverse cubital, apical portion of 1st cubitus and upper portion of basal vein about equal length, pigmented portion of 2nd cubital a little longer, width of the stigma less than the length of the 1st abscissa of radius, length nearly equalling that of metacarp. Legs: hind coxae strongly punctate (degree 3-4) above and to some extent on outer face, clothed with short silvery hairs. Abdomen: 1st tergite nearly twice as long as wide, truncate at apex where width is less than at base, lateral margins slightly curved and bowed outward, smooth and polished except on apical portion of lateral margins where it is slightly rugose, basal two-thirds depressed, 2nd tergite transverse, three times as wide as long, slightly convex in the middle, smooth and shining, as are also the following tergites. Cocoon white.

Described from two males reared from the caterpillars of an hesperid found on rattan at Tapatapao, Upolu, VII-17-40, by O. H. Swezey.

Apanteles upoluensis n. sp.

Male. 2.5 mms. long, black, antennae concolorous, the legs except front and hind coxae, apical half of hind tibiae, hind tarsi, also tegulae and trophi testaceous. Head: face, vertex and occiput finely punctate (degree 1). Thorax: mesoscutum with close but distinctly separated punctation (degree 4), disc of scutellum smooth and shining, only a few scattered fine punctures along the margins; propodeum rugose but not dull, with indistinctly formed areola and costulae, of which the carinae are very weak. Wings: 1st abscissa of the radius and transverse cubital vein not differentiated in their well-rounded course, apical portion of the 1st abscissa of the cubital plus the pigmented portion of the 2nd abscissa a trifle longer than the recurrent nervure in length but less than twice as long as the transverse cubital or the upper portion of the basal vein, the 1st abscissa of the radius longer than the stigma's width, stigma shorter than the metacarp. Legs: hind coxae on outer faces smooth and shining, punctate (degree 2) on the top basally, the longer hind tibial spur more than half the length of the basal joint of tarsus, the shorter one less than half. Abdomen: 1st tergite a little longer than wide, a little wider at apex than at base, the sides then hardly parallel though straight, the disc slightly convex, basally declivous, disc with sparse and shallow punctation basally, some short striae apically at the sides in shallow foveae, otherwise smooth and shining; 2nd tergite transverse, smooth and shining also, length into breadth would go three times, following tergites smooth and shining as well.

Described from one specimen (type) reared from a leaf-rolling caterpillar found on *Ficus* at Sinaele, Upolu, VII-27-40, by O. H. Swezey.

Apanteles agonoxenae n. sp.

Female. 2 mms. long, black, the legs except the coxae, the hind femora, tibiae apically and tarsi yellowish brown, hind tibiae at base and hind basitarsus and tibial spurs sordid white to brown, antennae and sheaths of ovipositor black also. Head: face finely punctate on smooth and shining surface (degree 1), vertex and occiput the same. Thorax: mesonotum rather closely and strongly punctate (degree 4-5), disc of scutellum for the most part smooth and shining, with scattered shallow punctuations (degree 4); metanotum with a median umbilicus; propodeon rugose and with well and strongly formed areola and costulae. Wings: 1st abscissa of the radius a little longer than the

transverse cubital, both rather thick and evenly rounded, the recurrent nervure hardly longer than the transverse cubital, about as long as the apical portion of the 1st cubitus plus pigmented portion of 2nd, the upper portion of the basal nervure only about half this or equal to one or the other in length, 1st abscissa of the radius as long as width of stigma, which is shorter than the metacarp. Legs: hind coxae smooth and polished on outer face, the femora finely punctate, tibial spurs about a third the length of the basitarsus. Abdomen: 1st tergite a little longer than wide, a little wider at the apex than at the base, where it is declivous, the surface strongly rugose, 2nd tergite transverse, length four into width, rugose but not as rough as 1st tergite, following tergites smooth; ovipositor sheaths longer than basitarsus, almost as long as femora.

Described from four specimens (type and co-types) reared from *Agonoxena argaula* caterpillars found on *Clinostigma oncorhyncha* at Afiamalu, Upolu, VI-27-40, by O. H. Swezey.

Apanteles afiamaluana n. sp.

Female. 1.75 mms. long, black, legs (except hind tibiae and basitarsus, which are infuscated), scape of antennae, stigma of wing and wings of first abdominal tergite, tegulae golden to dark brown. Head with face finely rugose and punctate (degree 1), vertex and occiput smooth and shining, with stronger punctuation (degree 2-3), mesonotum and scutellum not closely but evenly and strongly punctate (degree 4-5); propodeon smooth and shining except for some pin-point punctation near apical and lateral margin, and with a median longitudinal carina and strong apical and lateral marginal carinae. Wings with venation clear and sharp; 1st abscissa of the radius as long as width of stigma but hardly as long as the transverse cubitus, which it joins at a decided angle, the recurrent nervure almost as long as the transverse cubitus and about equalling the length of the apical portion of the 1st cubitus plus pigmented portion of 2nd cubitus; upper portion of basal small, no longer than the pigmented portion of 2nd abscissa of radius; metacarp longer than stigma. Legs: coxae smooth and shining, longer spur on tibiae one-half length of basitarsus, shorter one-third. Abdomen: 1st tergite a little longer than wide, apical width more than one-half basal width, surface faintly rugoso-punctate but not dull, 2nd tergite transverse, twice as wide as long, smooth and shining but with a few scattered punctures on the disc, which is separated from the wings by a curved groove or impression extending diagonally inward from apical lateral angle to basal margin, which it meets at about the apical lateral margin of the first tergite; following tergites smooth and shining; sheaths of ovipositor short, shorter than the hind basitarsus.

Described from one specimen reared from a lepidopterous leaf-miner, host (?), collected at Afiamalu, Upolu, 2200 ft. elev., VI-10-40, by O. H. Swezey.

Feeding Habits of Bufo Marinus

BY J. F. ILLINGWORTH
Honolulu, Hawaii

(Presented at the meeting of April 8, 1940)

Toads were abundant as usual in my fish pond in Kaimuki, giving me an opportunity to observe their feeding habits. During five weeks, following March 1st, 1940, I examined several of their stools each day—a total of 53 in all. We all know that toads will grab anything that moves. I was surprised, however, to find that their principal food in this location is the burrowing roach, *Pycnocelus surinamensis* (Linn.). These run from 40% to as high as 90% of the entire contents. At the start, the Chinese rose beetle (*Adoretus sinicus* Burm.) was on the wing, and some stools ran as high as 40 to 50% of their remains. Later, these fell off rapidly, with only 2 or 3 beetles per stool. This method gives a fine indicator of abundance on the wing.

I was interested to see how far Pheidole ants (*Pheidole megacephala*) were eaten. Most stools contained none, but following rainy nights when the ants threw up soil on the lawn, the toads fed upon them. In such rare instances, comprising about 10 to 20% of their castings. Stools containing ants contain much soil and mud, taken in with these tiny insects.

Toads swallow considerable plant trash, bits of leaves, grass clippings, etc., when grabbing the insects. Other insects found were in small numbers: grain beetles (*Tenebrionidae*), black grass bugs (*Geotomus pygmaeus*), black wasp (*Odynerus* ?), Fuller's rose beetle (*Pantomorus godmani* [Crotch]), one honey bee, and one large caterpillar (*Herse cingulata* [Fab.]).

Records should be taken in other locations to note variations. Also at various seasons. This indicates that the toads are destined to be an important check upon the burrowing roach, which has an important bearing in the tropics, as it is the intermediate host of the eye worm of chickens.

Hawaiian Sarcophagidae

BY H. DE SOUZA LOPES
Instituto Oswaldo Cruz, Rio de Janeiro

(Presented by E. H. Bryan, Jr., at the meeting of October 14, 1940)

Six species of Sarcophagidae are reported from the Hawaiian islands: *Ravinia lherminieri* (Desv.) (syn. *Sarcophaga pallinervis*), *Hystricocnema plinthopyga* (Wied.) (syn. *S. robusta* Aldrich), *Sarcophaga dux* Thomson, *Sarcophaga peregrina* (Desv.) (syn. *S. fuscicauda* Boettcher), *Sarcophaga haemorrhoidalis* (Fallen), and *Sarcophaga barbata* Thomson.

Two more species were found among the specimens sent to me from B. P. Bishop Museum by Mr. Bryan: *Sarcophaga albiceps* Meigen and *Sarcophaga orientaloides* Senior-White.

Ravinia and *Hystricocnema* are two well characterized genera: the remaining species I include provisionally in the genus *Sarcophaga* (*s. lat.*).

KEY TO GENERA OF HAWAIIAN SARCOPHAGIDAE

1. Female 7th tergite present and reduced to a pair of plates; penis one-jointed ..... *Ravinia* Desv.

1′. Female 7th tergite absent; penis with more than one joint..... 2.

2. Basal half of hind legs with many strong spines beneath; 6th female sternite with about the same development as the 6th tergite. ..... *Hystricocnema* Towns.

2′. Male hind legs normal; 6th female sternite much more reduced than 6th tergite..... *Sarcophaga* Meig. (*s. lat.*)

[*Ravinia lherminieri* may be recognized by its pale epaulets (pads with black bristles at the extreme base of the wing), its red male hypopygium, and absence of apical scutellar bristles (although there are two pairs of macrochaetae on the outer half of the scutellum.) There are six strong pairs of dorso-centrals, a pair of prescutellar acrostichals, and also three pairs of acrostichal bristles before the suture. There are no long hairs on the middle or hind legs.

Hystricocnema plinthopyga has black epaulets (as do also the species of Sarcophaga in Hawaii), the hypopygium of the male is yellowish-red, apical scutellar bristles present and crossing, small bristle-like hairs on the thorax unusually long, and the basal half of the hind femora, beneath, is thickly set with strong, stubby bristles, in irregular rows, with a tuft of hairs at its base. There are seven pairs of dorsocentrals, two strong pairs of prescutellar acros-

tichals, and at least six pairs of presutural acrostichals, decreasing in length from front to rear. E. H. B., Jr.]

Genus **Hystricocnema** Townsend, 1919.

Type species: **Hystricocnema plinthopyga** (Wied.), 1830.

Sarcophaga plinthopyga Wiedemann, 1830, Auss. Zweifl., Ins. 2: 360.
Sarcophaga tripartita Wulp, 1896, Biol. Centr. Amer., 2: 284.
Sarcophaga robusta Aldrich, 1916, Sarcophaga and allies: 268, fig. 128.
Sarcophaga plinthopyga Aldrich, 1924, Ann. Ent. Soc. America, 17: 210 (type redescribed).
Sarcophaga quadriforceps Curran, 1932, Medd. Zool. Mus. Oslo, no. 30: 365, fig.

Geographical distribution: Central and South America, Galapagos Is. and Hawaii.

Genus **Ravinia** Desvoidy, 1863.

Ravinia Desvoidy, 1863, Hist. Dipt., 2: 434.
Euravinia Townsend, 1917, Pr. Biol. Soc. Wash., 30: 191.

The type species of *Ravinia* is *Sarcophaga haematoides* Meigen, from Europe, and the type species of *Euravinia* is *Myophora lherminieri* Desv., from North America. These species are congeneric.

Ravinia lherminieri (Desvoidy), 1830.

Myophora lherminieri Desvoidy, 1830, Myodaires: 339.
Sarcophaga pallinervis Thomson, 1869, Eug. Resa: 535.
Ravinia communis Parker, 1914, Pr. Boston Soc., 35, pl. 1-5.
Sarcophaga communis Aldrich, 1916, Sarcophaga and allies: 253, fig. 120.
Sarcophaga lherminieri Aldrich, 1930, Proc. U. S. Nat. Mus., 78, art. 12: 13, (redescription of type.)

Geographical distribution: North America and Hawaii.

Genus **Sarcophaga** Meigen (*s. lat.*)

The species included in this genus belong to many genera, but the generic classification of the European and Oriental species is neither definite nor correct. It is best provisionally to consider all species as in *Sarcophaga s. lat.*

KEY TO SPECIES

1. Males ..... 2.
1′. Females ..... 7.
2. Hypopygium entirely black ..... 4.
2′. Second segment of hypopygium red ..... 3.
3. Prescutellar bristles absent ..... *S. haemorrhoidalis* (Fallen.)
3′. Prescutellar bristles present ..... *S. barbata* Thomson

4. Back of head with only the postocular cilia black, the remaining hairs entirely white ..... *S. dux* Thomson
4′. Back of head with one or two rows of black hairs..... 5.
5. Posterior tibiae without long villosity..... *S. peregrina* (Desvoidy)
5′. Posterior tibiae with long villosity..... 6.
6. Costal spine greatly developed..... *S. orientaloides* Senior-White
6′. Costal spine small..... *S. albiceps* Wied.
7. Hypopygium red ..... 8.
7′. Hypopygium black ..... 9.
8. 6th tergite dorsally divided, prescutellar acrostical bristles absent..... *S. haemorrhoidalis* (Fallen)
8′. 6th tergite entire, prescutellar acrostichal bristles present..... *S. barbata* Thomson.
9. Back of head entirely covered with white pile, only the postocular cilia black ..... *S. dux* Thomson.
9′. Back of head with one or two rows of black bristles..... 10.
10. 6th tergite dorsally divided..... *S. albiceps* Meigen.
10′. 6th tergite entire..... 11.
11. Costal spine greatly developed; 6th tergite well chitinized and with a marginal row of strong bristles..... *S. orientaloides* Senior-White.
11′. Costal spine small; 6th tergite poorly chitinized and with small marginal hairs ..... *S. peregrina* (Desvoidy)

Sarcophaga haemorrhoidalis (Fallen), 1816.
Musca haemorrhoidalis Fallen, 1816, Vet. Akad. Handl.: 236.
Sarcophaga haemorrhoidalis Boettcher, 1913, Deut. Ent. Zeit.: 10, fig. 37.

Geographical distribution: Europe, Asia, Africa, and North America.

Sarcophaga barbata Thomson, 1869.
Sarcophaga barbata Thomson, 1869, Euge. Resa: 533.
Sarcophaga falculata Pand., 1896, Rev. Ent., 15:185.
Sarcophaga argentina Brethes, 1916, Ann. Mus. Nac. B. Aires, 28:142.

Geographical distribution: Hawaii (original description), Europe, North America, India, and Argentine.

Sarcophaga peregrina (Desvoidy), 1830.
Myophora peregrina Desvoidy, 1830, Myodaires: 356.
Myophora subrotunda Desvoidy, 1830, Myodaires: 357.
Myophora rapida Desvoidy, 1830, Myodaires: 360.
Sarcophaga tritona Macquart, 1850, Dipt. Ex. Supl., 4: 234.
Sarcophaga irrequieta Walker, 1849, List, 4: 830.
Sarcophaga ochripalpis Thomson, 1868, Eug. Resa: 537.
Sarcophaga fuscicauda Boettcher, 1912, Ent. Mitt., 1: 168, fig. 5.
Sarcophaga ochripalpis Johnston and Bancroft, 1920, Pr. Roy. Soc. Queensland, 32:23.
Sarcophaga peregrina Johnston and Tiegs, 1922, Rec. Austr. Mus., 13: 177.

Geographical distribution: Australia, Formosa, and Hawaii.

Sarcophaga dux Thomson, 1869.
Sarcophaga dux Thomson, 1869, Eug. Resa: 534

This species was described from Hawaii and subspecies are reported from Europe, North America, Australia, and India.

Sarcophaga orientaloides Senior-White, 1924.
Sarcophaga orientaloides Senior-White, 1924, Rec. Indian Mus., 26: 244, fig. 31.

Geographical distribution: India.

Among the material sent by Mr. Bryan there were examples from Honolulu (4 males and 3 females).

Sarcophaga albiceps Meigen, 1826.
Sarcophaga albiceps Meigen, 1826, Syst. Beschr., 5: 22.
Sarcophaga albiceps Boettcher, 1912, Deut. Ent. Zeit.,: 729, fig. 24.

Geographical distribution: Europe and India.

Three males and 2 females were received from Honolulu, collected by Owen Bryant.

Book Review

BY C. E. PEMBERTON
Experiment Station, H.S.P.A.

(Presented at the meeting of March 4, 1940)

"Fleas of Eastern United States," by Irving Fox. February, 1940. Cloth. VI + 191 pp. 166 figs. (31 pls.). The Iowa State College Press, Ames, Iowa. $3.00.

We welcome the appearance of a volume devoted solely and thoroughly to a modern revision and discussion of 55 species of fleas occurring in the eastern United States. All but one of our local species are described and figured therein. Though not numerous in species, fleas have an important bearing on the health and comfort of man and animals in Hawaii. Seven species are now recognized in the Islands, some of which are known vectors of bubonic plague and murine typhus. Since 1899 there have been over 360 human deaths from bubonic plague in Hawaii and in recent years typhus has caused suffering among many people within Honolulu. The cat flea often becomes a source of great annoyance to local residents and the "sticktight" or "chicken" flea may be exceedingly common at times on poultry, dogs, cats and rats. Members of our Entomological Society are frequently required to identify some of these fleas, determine the origin of infestations and suggest remedial measures.

This book is particularly workable not only for the specialist but also for entomologists inexperienced in taxonomic studies of Siphonaptera. The concise introductory discussion on morphology and terminology, together with the profusion of clear-cut figures should enable most entomologists to use the complete keys without difficulty. Sections of the introduction dealing with methods of collection and preservation, together with paragraphs on life history and control, though short, bring together in a few pages, most of the answers to questions arising on these particular subjects. An extensive host index, selected bibliography and synonymic index also add greatly to the practical usefulness of the book.

With the frequent importation of pet animals to Hawaii and the large development of the local bird park or aviary in Honolulu, with fresh introductions of many sorts of new birds almost every year, it is conceivable that many more species of fleas will ultimately become established in the Islands and perhaps some are already here which we have not recognized. Our first, most handy and lucid reference work in a study of new or doubtful fleas, will now be Fox's "Fleas of Eastern United States."

The Genus Oechalia (Pentatomidae, Hemiptera)

BY ROBERT L. USINGER
University of California, Davis

(Presented by title by O. H. Swezey, at the meeting of January 4, 1940)

The genus *Oechalia* Stål belongs to the unaccountably predaceous subfamily Asopinae. The first specimens of *Oechalia* were collected on early voyages in the Pacific, the Hawaiian *grisea* on the "Reise um die Erde, von Dr. F. J. F. Meyen" (Burmeister, 1834), the Australian *consocialis* on the "Voyage de l'Astrolabe, pendant les années 1826-1829" (Boisduval, 1835) and the "Voyage autor du monde sur la Corvette la Coquille" (Guérin-Méneville, 1838), and the Hawaiian species, *patruelis* and *pacifica*, on the "Svenska Fregatten Eugenies Resa, 1851-1853" (Stål, 1859).

Due to the inadequate descriptions of the time and to the inaccessibility of the types, these early species have been confused in recent literature. Moreover, attempts to define the species precisely have been frustrated for want of knowledge as to the limits of specific variability.

The confused status of the Hawaiian species is illustrated by Kirkaldy's remarks (1902-1909). First considered as a single variable species (1902), Kirkaldy later (1907) discovered two types of eggs. In his "Notes on the Hemipterous genus *Oechalia*" (1909) he described a new species and resurrected at least one of Stål's species but completely confused the species of Burmeister and Stål, applying the names in his key to forms which did not even agree with the meagre details of the original descriptions. In his plate of illustrations accompanying this paper further confusion was added by his use of the name *pacifica* which had been rejected in favor of *patruelis* in the text.

Obviously the situation needed to be clarified by biological work to determine the limits of variation and by a review of the early literature. The life history work was started by me in 1935 at the Bishop Museum and was completed during my absence in 1936 by Miss Amy Suehiro. *Oechalia patruelis* Stål was reared through three successive generations, the bugs being fed on corn ear worm larvae at regular intervals. The size, coloration, shape of the humeri, and male genitalia remained constant throughout this work, thus providing a sound basis upon which to proceed.

Four hundred and twelve specimens collected mainly by O. H. Swezey, E. H. Bryan, Jr., W. M. Giffard and myself and fifty-six specimens from elsewhere in the Pacific, collected largely by E. C. Zimmerman, provided ample material for evaluation of the vari-

ous species. Upon checking the original descriptions carefully, it was found that all of the previously described Hawaiian species could be recognized. Revision of these determinations may be necessary when the types are examined but the present identifications appear to be correct. Inasmuch as all of the early collecting was done on Oahu it was only necessary to find characters in the descriptions of Stål and Burmeister sufficient for the identification of the limited number of species on this island. The fragmentary type of Kirkaldy's *kaonohi* and Van Duzee's types of *hirtipes* and *virgula* were available during the course of the work. As a result of the present study the number of species of *Oechalia* has been doubled, seven new species being described from various parts of the Hawaiian Archipelago. All types are deposited in the collection of the Bishop Museum and representative sets of all the species have been placed in the following collections: Hawaiian Sugar Planters' Experiment Station, Honolulu; United States National Museum, Washington, D. C.; British Museum (Natural History), London; and R. L. Usinger.

It is a pleasure to acknowledge the assistance rendered by Miss Amy Suehiro in completing the life history work and Mrs. Frieda Abernathy who so brilliantly illustrated the various stages in the life history.

DISTRIBUTION

The distribution of the genus *Oechalia* is, in some respects, very unique. The genus occurs over most of the Australian Region excepting the New Guinean, Melanesian, and Micronesian subregions. This tremendous range from Australia, Tasmania and New Zealand in the southwest to Rapa and remote Ducie in the southeast, thence northward through the Tuamotus, Marquesas and Line Islands to Hawaii and westward to Wake, embraces a large portion of Oceania. Negative evidence is never convincing in such little explored regions but the absence of *Oechalia* from New Caledonia, Tonga, and Samoa, though it is reported from Fiji, is difficult to understand. Absence from Guam and the Carolines probably means that it never reached Micronesia.

Most of this wide distribution represents the occurrence of the extremely variable *Oechalia consocialis*. Further study may reveal several species in this complex but the variation exhibited in the long series before me does not fall into distinctive types correlated with distribution. Hence there is no alternative but to consider this as a case of extreme variability. *Consocialis* does not reach the Hawaiian Islands but unaccountably occurs as far north as Fanning and Christmas Islands and then skips over to entirely isolated Wake Island.

The Hawaiian species of *Oechalia* form a distinct element which Kirkaldy has termed the subgenus *Hawaiicola*. The 13 species of

Hawaiicola occur mostly in the middle forest or upper forest zones though they may occasionally extend down to the lowlands. Most notorious of the lowland invasions was that of *kaonohi* during the campaign against the sugar cane leafhopper when it played a prominent role as a predator of this destructive insect in some of the sugar plantations of the island of Hawaii. It now exhibits the only case of discontinuous distribution among the Hawaiian Oechalias. All of the other species are either one-island endemics or occur on several adjacent islands.

LIST OF ONE-ISLAND ENDEMICS

virescens (Kauai)
patruelis (Oahu)
suehiroae (Maui)
similis (Maui)
acuta (Hawaii)
bryani (Hawaii)
ferruginea (Hawaii)
hirtipes (Hawaii)
virgula (Hawaii)

TWO-ISLAND ENDEMIC

grisea (Kauai and Oahu)

THREE-ISLAND ENDEMICS

swezeyi (Oahu, Molokai, and Maui)
kaonohi (Kauai, Maui, and Hawaii)

FIVE-ISLAND ENDEMIC

pacifica (all main islands except Hawaii)

Kaonohi stands alone among the various species groups. The remaining twelve species may be divided roughly into those with acute humeri and those with obtuse humeri. The group of species with acute humeri occurs at opposite ends of the island chain, *grisea, virescens,* and *patruelis* inhabiting Kauai and Oahu while the remaining four members of this group, *acuta, bryani, hirtipes,* and *virgula* are confined to the island of Hawaii. No species with acute humeri is known to occur on the intervening islands of Molokai, Lanai and Maui. On Hawaii two of the species with acute humeri are further isolated, nearly all records of *acuta* being on the slopes of Mauna Loa whereas *bryani* is apparently confined to Mauna Kea and its immediate environs.

The group of species with rounded humeri is common everywhere except on Hawaii and reaches its greatest development on the adjacent island of Maui. The single species, *ferruginea,* from Hawaii is very rare and is an aberrant member of the group. Typical of the group with rounded humeri is *pacifica,* a species which occurs on all of the islands except Hawaii and varies greatly but not consistently from island to island. The only other closely allied members of this group are *similis* and *suehiroae,* both confined to Maui. *Swezeyi* has angulately rounded humeri and has a distinctive facies. It occurs on the adjacent islands of Oahu, Molokai and Maui.

BIOLOGY

General features of the biology of the predaceous subfamily Asopinae are well known from the works of Kirkland (1897), Schumacher (1910-1911), Gulde (1919), and Knight (1923), while biological notes on the genus *Oechalia* have been contributed by Bergroth (1891), Swezey (1905), and Kirkaldy (1907 and 1909). Hence, detailed life history notes were more or less incidental in the present work. The object of these studies was to raise an *Oechalia* species through several generations in order to determine the limits of variation and hence the characters of specific importance in the group. As detailed below, this object was accomplished, adults having been obtained of the F_3 generation from an original group of fourteen eggs. It was discovered that the entire series was remarkably constant, both in morphological and color characters. The spines of the humeri were acute in all three generations and other specific characters were found to be equally reliable.

Oechalia patruelis Stål

Fourteen eggs were found on the under side of a *Coprosma* leaf in Haleauau Valley, Oahu, on March 8, 1936. They were arranged in an irregular "U"-shaped row, each egg glued at its base to the leaf and also fastened to its neighbor. From eggs laid later in captivity it was noted that newly laid eggs are pale cream color. They change within a few hours to olive-green or fuscous and develop a distinct bilobed cream-colored mark at the middle which extends nearly half the way around the egg. The eggs are subrounded and bear from seven to eleven (average 9.5) whitish "capitate processes" around the upper side. The dorsal surface (cap or lid) is smooth, polished, and fuscous at the middle but greenish white for a goodly area approaching the bases of the capitate processes. The chorion is finely granular throughout. The size is 1 mm. in diameter (slightly greater lengthwise to the bilobed pale marks), .84 mm. high to base of capitate processes, and 1.08 mm. total height to top of operculum. The capitate processes are .20 mm. in length and surround an area .88 mm. in diameter.

After four days the eye spots of the developing embryo become visible through the chorion. The general color is fuscous except for the ochraceous bilobed marks and the operculum at middle. The eye spots are red. The diameter increases to 1.05 mm. by 1.12 mm. and the height becomes 1.16 mm. The egg presents a decidedly asymmetrical appearance in lateral view because the side with the bilobed ochraceous mark is decidedly higher and more abruptly rounded than the gradually rounded other side.

On the fifth day the capitate processes are distinctly black tipped though they may become darker before this. The egg burster (Hey-

mons, 1906) which is so characteristic of Pentatomid eggs, becomes faintly discernible dorsally on the side nearest the eye spots. By the following day this becomes clearly visible as a black bar seen through the chorion.

Hatching takes place on the eighth day. The operculum breaks well above the insertion of the capitate processes at the "T"-shaped black egg burster. This is the elevated side of the egg where the vertex of the young nymph is located. The operculum raises as a broadly hinged flap as the bug swells tremendously by ingestion of air. The young nymph is bright orange at this time. When it is finally free of the shell the lid closes partially and the egg burster usually adheres to the front edge.

First nymphal instar. Freshly hatched nymphs become fully pigmented within a few hours. They appear relatively broad in this instar, the width across second abdominal segment exceeding the entire length of the insect, 35:: 34. The dorsal surface is strongly convex along middle and slightly expanded and flattened laterally. The head is strongly declivent, flattened above, the eyes small, tylus and juga distinct, the latter roundly reflexed laterally. The antennae are very thick, the apical segments being as thick as width of an eye, while the first three segments are more slender and are subcylindrical; proportion of segments one to four as 3:6:5:11. Rostrum very broad, almost as broad as thickness of femora, with the labial groove deeply impressed and conspicuous; labrum prominent, extending as a flap to apex of first segment; rostrum very long, attaining sixth abdominal segment. Thorax transversely wrinkled above, very broad, with a pale longitudinal line along middle revealing the line of sclerotic weakness where the break occurs during moulting. Abdomen very strongly convex, evenly rounded laterally but deflected posteriorly so that the apical segments are not visible from above. Underside comparatively flat, the lateral margins turned downward and the abdomen feebly emarginate at genital segments.

Color ferrugineous and pitchy black, the head, thorax, abdomen laterally except at sutures, legs, rostrum, and ventral abdominal segments laterally piceous. Elsewhere ferrugineous except for broad, transverse piceous marks dorsally on second abdominal segment, on third and fourth segments together, on fifth and sixth segments together, on apical margin of sixth and extending onto base of seventh and faintly on genital segments.

Size: Length 1.36 mm., width (abdomen) 1.4 mm., (head) .8 mm.

First instar nymphs are gregarious, clustering together and remaining motionless for long periods of time in the vicinity of the egg shells. This habit was noticed for a period of three days during which they increased greatly in size and became fully sclerotized.

Although no feeding was actually observed, the young bugs frequently touched the tips of their rostra to leaf surfaces so it is possible that they at least took up moisture and possibly some plant juices. On the fourth day they commenced to attack small caterpillars. There was still a tendency towards gregariousness at this time. Moulting occurred on the seventh and eighth days after hatching.

Second nymphal instar. Head and thorax distinctly longer, broader, and flatter than in the preceding instar. Antennae longer than head and thorax combined; proportion of segments one to four as 4:11:8:12. Rostrum slightly surpassing posterior coxae; proportion of segments one to four as 9:7:5:7. Thoracic nota moderately convex at middle, narrowly flattened laterally. Abdominal disk strongly convex. Color essentially as in first instar.

Size: Length 3 mm., width (abdomen) 2.1 mm., (head) .98 mm.

Average length of instar 4 days.

Third nymphal instar. Still larger but otherwise quite similar to preceding instar. Antennae scarcely longer than head and thorax combined; proportion of segments one to four as 4:18:12:16. Rostrum reaching to front margins of posterior coxae, proportion of segments one to four as 12:11:7:11. Thorax without trace of wing pads. Dorsal abdominal scent gland openings very distinct.

Size: Length 4.6 mm., width (abdomen) 2.85 mm., (head) 1.25 mm.

Average length of instar 3 days.

Fourth nymphal instar. General coloration and shape of head and abdomen much as in previous instar. Antennae slightly longer than head and thorax combined; proportion of segments one to four as 6:25:18:19. Rostrum reaching middle coxae, proportion of segments one to four as 15:14:10:15. Pronotum not abruptly flattened laterally, its posterior angles distinctly produced backward and its antero-lateral margins white. Hind margin of mesothorax strongly sinuate, roundly convex at middle, deeply concave sublaterally, and roundly produced as hemelytral pads laterally. Hemelytral pads scarcely reaching second visible abdominal segment. Hind margin of metanotum only feebly sinuate, the pads very feebly developed.

Size: Length 6.35 mm., width (abdomen) 4.05 mm., (head) 1.6 mm.

Average length of instar 8 days.

Fifth nymphal instar. Elongate oval and moderately convex above and beneath. Head broader across eyes than long, 38:30; disk subflattened and obscurely wrinkled; sides of juga sinuate in front of eyes, broadly rounded and a little dilated apically; slightly exceeding tylus which is narrowed basally and apically. Epicranial suture distinct on either side, extending from sublaterally on base of head to inner posterior angle of each eye, thus delimiting the

vertex as the postero-lateral portions of head behind eyes. Antennae inserted in front of eyes and beneath plate-like expansions of juga; distinctly shorter than head and thorax, measured on midline, 91 :: 100; proportion of segments one to four as 8 : 35 : 25 : 23. Rostrum very stout and broad, reaching to middle coxae, proportion of segments one to four as 20 : 17 : 13 : 15. Pronotum a little shorter than head on median line, three times as broad posteriorly as long on median line; disk transversely rugose and impressed by a fine longitudinal line along middle; depressed laterally on anterior half, the antero-lateral margins crenulate; anterior margins slightly concave; lateral margins feebly arcuate on anterior half, a little sinuate at posterior third and then moderately dilated, behind which the postero-lateral angles are strongly produced at sides of mesothorax, turned inward apically and subacute at tips; posterior margin slightly concave at middle, roundly produced over inner bases of hemelytral pads, concave again sublaterally beyond which the postero-lateral angles are produced as described above. Mesonotum large, rugosely punctate on triangular central portion and very finely, transversely wrinkled laterally on hemelytral pads; two-fifths longer than pronotum on median line where it is transversed by a similar fine longitudinal suture; posterior margin triangularly produced at center; hemelytral pads strongly produced laterally, reaching well onto third visible abdominal segment. Metanotum only briefly exposed on either side of triangular center of mesonotum, the metanotal wing pads broadly exposed at inner bases but concealed by hemelytral pads apically. Abdomen moderately expanded at sides, strongly convex above and beneath, with distinct, paired scent gland openings along middle of dorsal surface. First pair of scent glands smallest, situated on the anteriorly arched suture between third and fourth segments; second pair very prominent, enclosing a transverse elevated area and situated on the strongly anteriorly arched suture between fourth and fifth segments; third pair nearly as prominent as second and situated on the medianly arched suture between fifth and sixth segments. Lateral margins of abdominal segments above very narrowly carinate. Under surface rather smooth. Propleura sharply separated from lamellate pronotal margins, feebly elevated along anterior margins but with only ill-defined elevated areas in place of the propleural lobes of adults. Meso- and metasterna flat, with a smooth but scarcely depressed trough about as wide as rostrum. Second abdominal segment briefly produced over basal segment at middle. Legs stout, inermous but for a small spine at middle of inner side of front tibiae. Femora each with an anteapical rounded elevation beneath. Femora clothed with short erect hairs, tibiae and tarsi with denser short hairs and some long ones. Tarsi consisting of two subequal segments. Claws with prominent, pad-like arolia.

Color of head and thorax above mostly black, the sides of pronotum broadly in front and narrowly behind and sides of hemelytral pads narrowly on basal half white. Eyes reddish. Antennae dark basally and ferrugineous apically with pale joints. Abdomen above white with transverse dark fuscous areas surrounding scent glands and with an additional spot between sixth and seventh segments where two small points exist along the suture and suggest a possible fourth pair of gland openings. Segments black laterally with pale along lateral margins at the center of each spot. Genital segments fuscous. Rostrum brown marked with black. Head fulvous beneath with a dark spot behind each eye and a dark stripe on each side behind antennae extending to base of head. Thoracic pleura pale, marked and spotted with brown. Sterna white. Legs mottled with ochraceous and dark brown, the tibiae dark basally and apically and pale at middle, tarsi black. Abdominal venter white with a gradually posteriorly increasing series of brown marks at middle of segments. Segments laterally marked as on dorsal surface with the spiracles brown. Genital segments brown.

Size: Length 9.15 mm., width (abdomen) 4.45 mm., (head) 1.9 mm.

Average length of instar 8 days.

Ecdysis. The process of moulting is similar in all instars. The bug swells, thus breaking the epicranial head sutures and the longitudinal thoracic suture. The anterior portion, including the frons and clypeus, of the nymphal head is bent forward as a flap and the thoracic terga are bent outward from the mid line as the bug emerges. Fifteen minutes are required for casting the old skin and the adult is fully sclerotized and pigmented after three and one-half hours.

Copulation was observed eight days after the last molt and the first eggs were laid six days later.

TAXONOMY

The best specific characters in *Oechalia* appear to be form of the humeri, length and shape of the abdominal spine, general coloration and to some extent body form, color and pilosity of legs, and size and shape of male genital plates and harpagones. In two cases the male genitalia provide practically the only differential characters but fortunately the rest of the species exhibit additional distinctive characters. Even in clear cut cases the male genitalia are so reliable and distinctive that they should be carefully studied. Identifications made on the basis of female specimens alone should always be considered as provisional.

The opening of the genital chamber is often concealed by the posterior abdominal terga or by the membrane. In such cases the capsule should be pulled outward and downward, preferably while

the specimen is still fresh. The operation is easily performed on relaxed specimens or the capsule may be removed from dried specimens and mounted on a card. Terminology of the genitalia follows that of Baker (1931). The width of the genital plates is measured from a caudal view along a transverse axis, the width being greater than the length (vertical measurement) in all cases.

The extent to which the humeri are produced is indicated by measuring the total width of pronotum across humeri and dividing this by the distance from the edge of a hemelytron at base to the apex of a humerus. For example, if the width of pronotum across humeri is 112 micrometer units and the humeri extend 14 units beyond the bases of hemelytra, then the humeral angles are produced one-eighth of the total width of pronotum beyond bases of hemelytra. The total width of an insect is always measured across the apices of humeri.

There is but little basis for a phylogenetic arrangement of species. However, the widespread and presumably generalized *consocialis,* with acute humeri, a short abdominal spine, and obsolescent propleural lobes, has been placed first. Then follow the various Hawaiian species, those with acute humeri first. Within each group the widest distributed species and those which occur on the oldest islands are placed before the one-island endemics which may exhibit unique characteristics and which are assumed to be derived or specialized.

Genus **Oechalia*** Stål

Oechalia Stål, 1862, Stett. Ent. Zeit., 23: 93.
Oechalia Stål, 1864, Hem. Afr., Vol. I, p. 63.
Oechalia Stål, 1870, Enum. Hemipt., 1: 58.
Oechalia, Blackburn, 1889, Proc. Linn. Soc. N. S. Wales (2)3: 343.
Oechalia, Kirkaldy, 1902, Fauna Haw., 3: 171.
Oechalia, Schouteden, 1906, Genera Ins., fasc. 52: 75.
Oechalia, Kirkaldy, 1909, Proc. Haw. Ent. Soc., 2: 82-84, pl. 2.
Oechalia, Kirkaldy, 1910, Fauna Haw., 2: 533.

Elongate-oval in form, broadest across humeri, tapering abruptly anteriorly and more gradually posteriorly. Feebly convex above, the pronotal disk even slightly concave between elevated humeri in some species, the head and anterior portion of pronotum moderately declivous; more strongly convex beneath.

Head as long as wide across eyes and only slightly (one-twelfth) shorter than pronotum on median line; a little elevated subbasally and at basal third of tylus; sides sinuate just in front of eyes, then briefly subparallel, evenly rounded or roundly truncate at apex. Sides of juga thick but beveled to a thin edge basally, thinnest at inner apical angles which converge to nearly or quite enclose the narrowed apex of tylus in some cases. Disk with a constant pattern of punctures and laevigate areas arranged in longitudinal rows. Juga punctured laterally except along the extreme edges, smooth and impunctate along the middle. Tylus laevigate but for deep punctures at middle of apical third and a row of punctures along either side of middle posteriorly.

* Oechalia, from Οιχαλια, a city on the island of Euboea in central Greece.

Eyes entirely surrounded by an impunctate area which extends to the ocelli but which is limited antero-medially by an ill-defined oblique suture mesad of which there may occur a smooth area containing only one or two punctures. Three longitudinal glabrous stripes in punctate area of head between ocelli and behind tylus, the median stripe being a continuation of that of middle of tylus, whereas the lateral stripes are interrupted by one or two deep punctures from the medially widening laevigate jugal areas. Eyes but little prominent, not surpassing level of anterior angles of pronotum, two-fifths as wide as interocular space, contiguous with anterior pronotal angles. Ocelli located slightly behind level of posterior margins of eyes, over four times as far apart as distance from ocelli to eyes or to hind margin of head. Under surface nearly impunctate, with prominent antenniferous tubercles arising at front margins of eyes, partially visible from above, divided by a suture on apical third. Hypostomal region just behind rostrum with a transversely rugose, shallowly depressed area bounded on either side by feeble longitudinal carinae which disappear well before base of head. Rostrum inserted behind apex of head, the intervening space being occupied by the labrum. Bucculae small but distinct laterally, forming a continuous but very feeble arch behind rostrum. Rostrum reaching about to hind margins of middle coxae, stout and flexible, the basal segment widest, as wide as thickness of front femur, second widest at apex where it is one-third narrower than basal segment, third only slightly narrower than second at its widest point at basal third, fourth less than half as wide as first at base, tapering to apex; first, third and fourth segments subequal or decreasing slightly in length in the order given. Second segment one-third longer than the others. First segment reaching to basal fourth of head. Antennae simple, slightly shorter than combined lengths of pronotum and scutellum, inserted directly in front of the eyes and partially beneath bases of juga. First segment not reaching apex of head, cylindrical, second and third segments slightly enlarged apically, fourth widest at middle, fifth feebly fusiform. First segment shortest, fourth longest, about three times as long as first, the remaining segments subequal or the fifth slightly the longest, or shortest, sometimes nearly as long as fourth.

Pronotum more than twice as broad across humeri as long. Front margin roundly concave, especially so behind interocular space. Antero-lateral angles scarcely to distinctly produced as blunt teeth with a continuous row of approximately a dozen rounded teeth along obtuse antero-lateral margins extending half way to humeral angles. Humeral angles more or less strongly produced and acuminate, directed laterally or bent slightly backwards and often feebly elevated. Apices always simple. Posterior angles subroundly produced over basal angles of scutellum, the posterior margin of pronotum concave between these angles. Disk deeply punctate in irregular rows, the margins narrowly impunctate. Laevigate anterior margin continuing posteriorly between callosities with lateral branches just in front of callosities. Callosities transverse, bounded by a row of deep punctures on all sides, surrounding an elevated laevigate area at middle, their surface minutely granular.

Scutellum three-fourths longer than pronotum on median line, subtriangular in outline, the base being feebly arcuate, nearly straight at middle but obliquely truncate laterally at posterior angles of pronotum. Sides rather evenly posteriorly narrowed on basal four-sevenths, the apical narrowed portion more gradually tapering to acutely rounded apex. Disk moderately elevated on basal fourth, feebly depressed on apical fourth, coarsely punctate in irregular rows, with a percurrent but anteriorly ill-defined impunctate longitudinal line at middle. Punctures finer and sparser on apical fourth.

Hemelytra exceeding tip of abdomen, corium about one-third longer than scutellum. Emboliar suture distinct on basal three-fourths, the single row of emboliar punctures at base diverging into about four irregular rows posteriorly. The rest of corium generally but very irregularly punctured except for two rows along claval suture. Clavus narrowed posteriorly, terminating beneath the attenuated portion of scutellum, with three rows of punctures basally narrowed to a single row towards the apex.

Membrane generally lightly infuscated with eight more or less distinct dark brown longitudinal veins. The three simple inner veins arising from a single basal arm which then curves around to follow the course of apical margin of corium, giving off the long simple fourth vein, an arm which forks to produce the fifth and sixth veins, and an outer seventh vein. This last unbranched but joining the irregular and apparently independent outermost or eighth vein near apex.

Exposed portion of connexivum very finely, evenly punctured except along smooth, impunctate edges. These edges are very narrow on the anterior portion of each segment but widen slightly so that the posterior angles are very briefly but distinctly produced and acute. They are increasingly acute on the posterior segments.

Under surface in great part shallowly to distinctly punctate, the thoracic sterna and middle of venter impunctate. Propleura with a more or less distinct short spine sublaterally beneath and near the base of humeral spines. Anterior propleural margin moderately to strongly carinate on either side, forming a reflexed lamella which extends sinuately from anterior angle of pronotum around hind margin of eye, then curves forward in front of anterior acetabula and is produced as a brief or prominent rounded lobe on side of prosternum. Prosternum widening anteriorly, the anterior margin concave at center and convexly arcuate on either side forming brief plate-like extensions in front of propleural carinae; disk feebly punctured laterally on anterior half and extending along anterior lateral plates. Mesosternum impunctate, longitudinally depressed into a distinct minutely pubescent groove. Suture between meso and metapleuron dull only very narrowly along edges, briefly parting near the middle, the ostiolar orifice opening between the middle and hind acetabula into a very brief, ill-defined groove without elevated canal or well defined evaporating area. Posterior and lateral margins of metapleura set off by a rounded suture, moderately reflexed and, at least posteriorly, plate-like. Metasternum forming a strong transverse ridge. Abdominal venter with sparse, erect or posteriorly directed hairs. Second visible ventral segment strongly produced forward, covering the first segment which is reduced to a single ridge at center. The abdominal spine continues between coxae, attaining at least the middle coxae, tapering towards apex, compressed on inner or dorsal side, bent slightly downward apically and subrounded at apex.

Sixth visible abdominal segment in the male deeply, roundly emarginate ventrally, broadly produced as a thickened lobe sublaterally and briefly, acutely produced at postero-lateral angles. Seventh visible abdominal segment reduced, submembranous and briefly exposed ventrally at base of eighth visible segment. This last (actually the ninth segment) is the genital segment. At rest it is retracted into the preceding segments so that the posterior or ventral surface only may be visible. The segment (see figure 1) is capsule-like, about two-thirds or three-fourths as deep as wide with the ventral margin produced outward and upward to form a genital chamber. The ventral margin is roundly emarginate at center and briefly, narrowly notched laterally. The dorsal surface of the capsule is longitudinally carinate and the postero-dorsal border is concave at the middle where it forms an arch over the proctiger. It is feebly emarginate on either side of the slightly produced median carina, with an elevated and feebly produced knob on either

side just laterad of the concavity, each knob bearing a linear tuft of long, posteriorly directed bristles. The postero-dorsal border is rather evenly rounded on either side of middle to lateral angles and bears scattered bristles directed caudad and mesad. The ventral surface of the capsule is feebly concave posteriorly and is densely clothed with long stiff hairs.

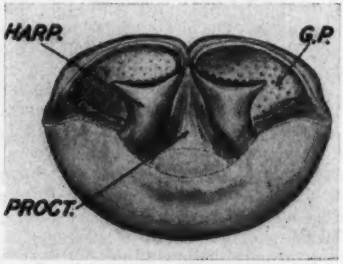


Figure 1. *Oechalia pacifica* (Stål) Haleakala, Maui. Caudal view of male genital capsule showing the genital plates (G.P.), harpagones (HARP), and proctiger (PROCT.).

Inside the genital chamber are located the proctiger, genital plates, and harpagones (figure 1). The proctiger is median and prominent. It is longitudinally carinate and slightly concave along the middle. The genital plates vary in size and shape according to the species. They are attached to the inner dorsal wall of the genital chamber and occupy the dorsal area on either side of the proctiger. They are wider than long, concave, and covered on the concave face with distinct tubercles. The harpagones arise from the center of the genital chamber and project caudad, curving upward to face the genital plates. They are variously compressed or dilated apically, usually with more or less distinct lateral arms forming a subtriangular apex and with a notched or crenulate inner face opposite the genital plates.

Sixth visible ventral segment in the female likewise roundly emarginate but more broadly so than in the male with the margins thickened but not produced sublaterally. Postero-lateral angles briefly, acutely produced. Basal genital plates subtriangular, broad, the anterior and posterior margins more or less rounded. Disks feebly punctured and clothed with erect hairs posteriorly. Apical plates smaller, likewise subtriangular, about as long as broad, subrounded apically, and indented at inner basal angles to receive lateral basal extensions of median lobe. Median lobe very small, twice as broad as long, evenly rounded on posterior margin. Lateral lobes roundly produced and thickened, extending well beyond level of apical connexival angles, connected medially by a shallow, subrectilinear emargination of last abdominal tergite.

Legs inermous. Coxae and trochanters impunctate. Femora moderately incrassate, being slightly thickest at middle, very superficially or not at all punctate and sparsely beset with erect hairs which may become as long as the thickness of femora. Tibiae slightly enlarged apically, clothed with erect bristles which are as long as the thickness of tibiae and with shorter dense hairs at inner apex. Tarsi a little over half as long as tibiae, the first segment longest, second shortest, third a little shorter than first, thickened apically

and bearing two prominent, curved claws with pad-like arolia beneath each. Tarsi with short dense hairs along ventral face and with long erect bristles apically.

Ground color varying from testaceous or ochraceous to fuscous or ferrugineous with dark brown to black stripes on punctate areas of head and surrounding ocelli and with more or less extensive dark brown or black areas on pronotal, scutellar and hemelytral disks. Scutellum darkest on basal and on subapical fourths and ivory-white at apex. Membrane brownish hyaline with darker veins. Finely punctate inner plates of connexivum black at least along sutures. Under surface in great part pale with superficial brown punctures laterally. Antennae fuscous or fulvous to ferrugineous. Eyes usually brown. Ocelli pale or with a reddish tinge. Rostrum infuscated apically. Legs ochraceous to fulvous with darker spot on femora and with claws tipped with dark brown. Harpagones and genital plates usually dark brown.

Size ranging from 7½ to 14 mm. in length and from 4 to 7 mm. in width across humeri.

Genotype: *Arma schellenbergi* Guér. (= *Oechalia consocialis* Boisduval).

Oechalia belongs to the group of Asopinae with the scutellum moderately developed and simple at apex, the head a little shorter than the pronotum, the eyes contiguous to anterior margin of pronotum, the juga simple, the anterior femora inermous, the rostrum with first, third and fourth segments subequal, second a little longer, and with a very prominent, strongly produced spine from the second visible abdominal segment.

Oechalia differs from all related genera in the possession of a broad longitudinal sulcus or depression along the mesosternum. This is a striking contrast to the usual carina, often very prominent and grooved, which is seen in most Asopinae. Another distinctive character is the distinctly elevated, sinuate anterior propleural margin which is produced mesad to form a tubercle on either side of the prosternum.

Oechalia bears a superficial resemblance to *Platynopus* and *Parealda,* both Pacific genera, but both of these have prominent mesosternal carinae and short abdominal spines and *Platynopus* has anteapical spines on the front femora. The large American genus *Podisus* is likewise related to *Oechalia* superficially, some species having inermous front femora and other *Oechalia* characters. *Podisus* has a low but distinct mesosternal carina, however, and a very short abdominal spine. The genital plates of *Oechalia* are not unlike those of the American *Alcaeorhynchus* and the cosmopolitan *Zicrona.*

To summarize, it may be said that *Oechalia* occupies a rather isolated and unique position in the subfamily Asopinae with no really close relatives known.

KEY TO THE SPECIES OF OECHALIA

1. Abdominal spine short, not surpassing middle coxae. Propleural lobes obsolescent on either side of prosternum. Subhumeral spines only feebly developed. Australia, New Zealand, Polynesia except Hawaiian Islands. Subgenus *Oechalia*.....(1) *consocialis*

—. Abdominal spine long, surpassing middle coxae. Propleural lobes distinctly produced on either side of prosternum. Subhumeral spines small but distinct. Hawaiian Islands. Subgenus *Hawaiicola* ..... 2.

2. Humeri strongly produced into straight or slightly sinuate, acute or subacute spines which extend about one-eighth of the total width of pronotum beyond bases of hemelytra..... 3.

—. Humeri only briefly, roundly or subangulately produced, extending one-twelfth or less of the total width of pronotum beyond bases of hemelytra ..... 9.

3. Ground color ferrugineous marked with the usual fuscous to black punctures and with the scutellum pale at apex. Legs densely clothed with long, erect hairs, those of femora about two-thirds as long as thickness of femora. Abdominal spine reaching middle of mesosternum, tapering and subrounded at apex and bent feebly downward apically. Genital plates less than one-third the width of capsule. Harpagones feebly dilated apically, the width across tips of arms three-fifths as great as width of genital plate. Hawaii .....(8) *hirtipes*

—. Ground color never distinctly ferrugineous. Hairs of legs shorter or less dense..... 4.

4. Upper surface distinctly tinged with green. Abdominal spine reaching middle of mesosternum, tapering, rounded at apex and bent downward. Genital plates less than one-third the width of capsule. Harpagonal arms well developed, especially the ectal one, width across arms three-fourths the width of genital plates. Kauai .....(3) *virescens*

—. Upper surface never tinged with green..... 5.

5. Legs usually red. Abdominal spine very long and slender, reaching nearly to front coxae, bent downward toward apex. Genital plates large, one-third the width of genital capsule. Harpagonal arms feebly produced, the width across arms one-half to two-thirds the width of genital plates. Oahu.....(4) *patruelis*

—. Legs ochraceous or fulvous. Genitalia otherwise..... 6.

6. General coloration usually appearing as light brown because of extensive ochraceous ground color and fuscous punctures. Genital plates a little less than one-third as wide as capsule. Harpagonal arms strongly produced, four-fifths as wide across apices as width of genital plates. Kauai and Oahu.....(2) *grisea*

—. General coloration usually darker. Harpagones less strongly dilated apically. Hawaii..... 7.

7. Humeral angles strongly sinuate. Genital plates large, a little more than one-third as wide as capsule. Harpagones asymmetrical, the ectal arms entirely wanting and width at apex only one-third that of genital plates. Hawaii.....(7) *virgula*

—. Humeral angles less strongly sinuate or straight. Genital plates relatively smaller and harpagones more symmetrical..... 8.

8. Upper surface with extensive dark areas. Humeri straight. Abdominal spine relatively short, reaching to about middle of mesosternum. Size relatively large, 11½ to 12 mm. Genital plates less than one-third as wide as capsule. Harpagonal arms

moderately produced, two-thirds as wide across apices as width of genital plates. Slopes of Mauna Loa.....(6) *acuta*

—. Upper surface with less extensive dark areas. Humeri feebly sinuate. Abdominal spine long and slender, reaching front coxae. Size smaller, 9½ to 11 mm. Genital plates less than one-third as wide as capsule. Harpagonal arms about two-thirds as wide across apices as width of capsule. Slopes of Mauna Kea .....(5) *bryani*

9. Body long and slender, nearly two and one-half times as long as broad, 11::4½. Pronotum relatively narrow, the humeri extending only about one thirty-second of the total width of pronotum beyond bases of hemelytra. Pronotum little more than twice as broad across humeri as long, 95::45. Abdominal spine reaching a little beyond middle of mesosternum, nearly straight, the apex angulate at least dorsally. Genital plates slightly more than two-thirds as wide as capsule. Harpagonal arms strongly asymmetrically produced, the distance across apices nearly as great as width of genital plates, 19::18. Hawaii, Maui, Kauai.....(14) *kaonohi*

—. Body form shorter and broader, never more than twice as long as broad. Pronotum broader, the humeri extending one-twelfth to one-eighteenth of total width of pronotum beyond bases of hemelytra. Harpagonal arms never so strongly produced..... 10.

10. Color in great part ferrugineous. Humeri moderately, angulately produced, extending about one-twelfth the total width of pronotum beyond bases of hemelytra. Hawaii.....(9) *ferruginea*

—. Color light or dark brown. Humeri shorter, extending only one-fourteenth or one-sixteenth the total width of pronotum beyond bases of hemelytra. All islands except Hawaii..... 11.

11. Coloration light brown, the ground color testaceous with light brown punctures. Abdominal spine short, reaching only to middle of mesosternum, tapering to briefly rounded apex. Humeri very briefly but angularly produced. Genital plates small, about one-fourth as wide as capsule. Harpagonal arms distinctly produced, five-sixths as wide across apices as width of genital plates. Molokai, Maui, Oahu.....(13) *swezeyi*

—. Color usually darker. Abdominal spine long and slender, reaching nearly to front coxae, bent downward and then slightly recurved at tip ..... 12.

12. Upper surface nearly concolorous, generally fusco-ferrugineous with pale areas, including apex of scutellum, only faintly indicated. Humeri very short, extending about one-sixteenth the total width of pronotum beyond bases of hemelytra. Genital plates small, one-fourth as wide as capsule. Harpagones five-sixths as wide across apices of arms as width of genital plates. Maui.....(12) *suehiroae*

—. Upper surface brownish to nearly black with sharply contrasting white markings particularly on apex of scutellum. Humeri a little more produced, extending one-fourteenth the total width of pronotum beyond bases of hemelytra..... 13

13. Genital plates less than one-third as wide as capsule, 14::50. Harpagonal arms scarcely produced, the apices of harpagones triangular in shape, less than half the width of genital plates, 6::15. Known only from Kula Pipe Line, 4500 feet, Maui.....(11) *similis*

—. Genital plates larger, two-fifths as wide as capsule, 19::47. Harpagones strongly asymmetrical, the ental arms produced upward almost as continuations of inner edges while the ectal arms are bent abruptly downward. Width measured obliquely across apices of arms about three-fifths the width of genital plates, 12::19. Kauai, Oahu, Molokai, Lanai, Maui.....(10) *pacifica*

Subgenus **Oechalia** Stål, Kirkaldy (1909)

Oechalia Stål, Kirkaldy, 1909, Proc. Haw. Ent. Soc., 2:83 (typical subgenus).

Propleural ridge reduced, the lobes on either side of prosternum only feebly developed. Spine of second abdominal segment not extending beyond middle coxae.

Genotype: *Arma schellenbergi* Guér. (= *Oechalia consocialis* Boisduval).

1. **Oechalia consocialis** (Boisduval)

Pentatoma consociale Boisduval, 1835, Voy. Astrol., Entom., 2:630, pl. 11, fig. 9.
Pentatoma schellembergi Guérin, 1838, Voy. Coq. Zool., 2:166, pl. 11, fig. 9.
Oechalia schellenbergi, Mayr, 1868, Reise Freg. Novara. Hem., p. 32.
Rhaphigaster perfectus Walker, 1867, Cat. Heter. Br. Mus., 2:371.
Oechalia consocialis, Stål, 1870, Enum. Hemipt., 1:59.
Oechalia consocialis, Schouteden, 1906, Genera Insectorum, fasc. 52:75, pl. 5, fig. 12.

Male. Head as long as wide across eyes, a little shorter than pronotum on median line, 36::40. Antennae as long as pronotum and scutellum together, proportion of segments one to five as 7:20:22:25:21. Rostrum extending to middle coxae, the proportion of segments one to four as 15:20:15:15. Pronotum two and one-half times as wide across humeri as long on median line; humeral angles produced about one-fourteenth of total width of pronotum, 7::100, beyond bases of hemelytra, gradually and fairly evenly narrowed to an acute point. Scutellum two-thirds as long as width of pronotum across humeri, three-fourths as broad at base as long; disk rather strongly elevated on anterior third, less so at middle, and lowest on apical third, punctate much as on center of pronotal disk with basal angles narrowly and a slender, feebly raised longitudinal line along middle impunctate and the apical region sparsely punctate; sides of narrowed apical third gradually rounded to scarcely acute apex. Connexival angles not backwardly produced, nearly right angles. Propleural carina ill-defined adjacent to acetabulum and only feebly produced at edge of prosternum in front of anterior coxa. Propleura each with a small, ill-defined elevation or tubercle beneath humeral angle adjacent to base of hemelytra. Abdominal prolongation gradually narrowed and rounded apically forming a continuous line with the gradually elevating mid line of the abdomen and reaching level of middle of intermediate coxae. Femora sparsely beset with erect bristles which are one-fourth to one-third as long as thickness of femora.

Genital plates nearly one-third as wide as entire width of genital cup, 10::33, and three-fourths as long as wide. Shape roughly rectangular but the inner dorsal margin subrounded on median half with only a small tubercle to indicate the angle. Outer dorsal angle distinctly produced. Lateral margin concave. Ventral margin and to a less extent dorsal margin crenulate. Disk distinctly concave, irregularly and inconspicuously tuberculate. Harpagones prominent, four-fifths as wide as genital plates, with nine teeth on the inner surface and with lateral arms about equally produced on either side. Female, with basal genital plates subrounded posteriorly. Apical plates subtriangular, about as long as broad, subrounded apically, indented at inner basal angles to receive lateral basal extrusions of median lobe. Median lobe twice as broad as long and evenly rounded on posterior margin. Lateral lobes extending slightly beyond apical connexival angles, rounded.

Color fuscous to ferrugineous mottled with more or less extensive ochraceous laevigate areas between punctures. Antennae brown, legs pale testaceous on coxae and trochanters, fulvous mottled with brown or orange on femora, apices of tibiae and all of tarsi brown. Eyes brown. Rostrum pale with apical segment brown. Head black above with an ochraceous stripe along middle of each jugum, three ochraceous stripes on vertex, the middle one extending forward and embracing most of tylus. Ochraceous immediately surrounding eyes, fuscous at apex of antenniferous tubercle above, and testaceous on under surface. Pronotum ochraceous with brownish ferrugineous punctures, brown callosities, and nearly black humeral angles. Scutellum broadly dark brown at middle of basal fourth and again at subapical fourth, elsewhere ochraceous with brown punctures except on apical fourth where the punctures are likewise pale. Clavus, corium and embolium ochraceous with brown punctures except broadly at middle, near inner apex and along apical margin of corium where there is a suffusion of ferrugineous. Membrane clear hyaline with dark brown veins and a generally embrowned stripe near apex at connecting of outer two veins. Connexivum broadly black at base and apex of each segment, pale in between, the impunctate extreme margin pale except for narrowly black posterior angles. Under surface in great part yellowish testaceous with the punctures laterally brown and with sides of abdominal venter more generally suffused with brown or reddish. Mesosternum red on either side of median sulcus. Genital cup externally pale. Genital plates and apices of harpagones brown.

Described from material collected by E. C. Zimmerman on Rapa Island in July, 1934. Nearly one hundred specimens of this widespread species are at hand from the following localities: Australia, Fiji, Fanning, Christmas, Wake, Ducie, Rapa, Oeno, Pitcairn, Society islands of Tahiti, Raiatea, Tahaa and Bora Bora, Marquesan islands of Eiao, Mohaotani, Uahuka, Uapou, Tahuata, Hatutu, and Fatuuku, Tuamotu islands of Makatea and Fakarava, Austral islands of Rimatara and Raivavai, and Mangarevan islands of Akamaru, Aukena, Mangareva, Agakauitai. It has also been recorded from Tasmania and New Zealand. Taken during the months from May to August inclusive.

A tremendous degree of variation is exhibited in this species. The smallest specimens (7½ mm.) with the pale laevigate areas of upper surface predominant are from widely separated Christmas Island in the Line Island group and Aukena Island in the Mangarevan group. The largest specimens (11½ mm.) are from Australia and Rapa but much smaller specimens occur in both of these places. The darkest specimen is from Rapa as is also the most uniformly ferrugineous specimen.

There would be ample justification for the separation of geographical subspecies if these superficially striking differences were at all constant or consistent. However, in the absence of any apparent correlation, at least in the present material, I am obliged to consider these forms simply as variants within the single widespread and extremely variable species.

Subgenus **Hawaiicola** Kirkaldy

Hawaiicola Kirkaldy, 1909, Proc. Haw. Ent. Soc., 2: 83.

Prosternum with a well developed lobe on either side. Spine of second abdominal segment extending well beyond middle coxae.

Genotype: *Asopus griseus* Burmeister.

Although the above differences are only quantitative and certainly not of generic significance, they serve admirably to separate the Hawaiian species from the widespread *consocialis*. Hence the subgenus is retained.

2. **Oechalia grisea** (Burmeister)

Asopus griseus Burmeister, 1834, Nova Acta Ac. Leop., XVI, Suppl., p. 293.

Male. Head shorter than width across eyes, 36: : 40, shorter than pronotum on median line, 36: : 40; punctures of upper surface very dense, numerous and confluent leaving the impunctate areas as distinctly delimited, laevigate longitudinal elevations. Antennae about seven-eighths as long as combined lengths of pronotum and scutellum on median line, proportion of segments one to five as 8: 20: 21: 24: 20. Rostrum reaching nearly to apices of middle coxae, the proportion of segments one to four as 19: 19: 15: 12. Pronotum nearly three times as broad across humeri as long on median line, 114: : 40, the humeral angles strongly produced, slightly backwardly directed, elevated so that the pronotal disk is concave between the humeri, anterolateral margins distinctly, deeply crenate, bearing 9 or 10 rounded teeth. Humeral angles produced about one-eighth the total width of pronotum beyond bases of hemelytra. Connexival angles distinctly produced as short acute spines. Anterior prolongation of second abdominal segment very stout and long, slightly curved ventrad from the continuous axis of the mid venter of the abdomen near its apex and reaching well past intermediate coxae to or near front margin of mesosternum. Legs only sparsely pubescent, the hairs of femora about one-third as long as the thickness of femora.

Genital plates nearly one-third as wide as width of genital cup, 15: : 49, half again as wide as long, 15: : 10, the dorsal and ventral sides rather evenly arcuate and crenulate forming an inner obtuse angle, these margins distinctly crenulate. Outer dorsal angle produced into a short, broad arm, the outer margin consequently deeply notched. Disk concave and covered with small but distinct tubercles. Harpagones stout, branching apically to four-fifths the width of genital plates, ectal arm much longer and more slender than ental arm, inner surface facing genital plates with about ten blunt elevations or teeth. Lateral lobes of female genitalia not rounded apically, produced into thickened and rounded lobes either side of the central depressed area. These lobes and the slightly enlarged posterior portions of apical plates bearing numerous stiff hairs.

Color ochraceous with black or fuscous punctures, the confluent punctures of the head black. Humeri blackish. Scutellum pale apically, often darkened subapically and basally. Connexivum distinctly alternated. Veins of membrane dark brown to black. Eyes and callosities brown. Antennae pale on basal half, fulvous apically. Rostrum pale with fulvous at extreme apex. Legs rather uniformly ochraceous or fulvous with slightly darker tarsi. Abdominal prolongation very pale, slightly transparent.

Size ranging from 9½ mm. by 5½ mm. (smallest male) to 13½ mm. by 7½ mm. (largest female).

Described from a male collected by J. C. Bridwell on Mt. Tantalus, Oahu, June 10, 1917, and a female collected by W. M. Giffard at 1300 ft. on Mt. Tantalus, February 19, 1905.

Other material before me is from Tantalus, Lanihuli, Manoa-Palolo Ridge, Nuuanu Pali, Kalihi, Leilehua, Waiahole, Wailupe, Palikea, and Moanalua in the Koolau Range and Kaala and Palehua in the Waianae Mountains of Oahu taken in all months of the year except February, March, July and August by E. H. Bryan, Jr., O. H. Swezey, G. W. Kirkaldy, W. M. Giffard, T. Blackburn and R. L. Usinger.

Perfectly typical specimens from the island of Kauai are from Puu Ka Pele, Alakai Swamp, Kumuwela, Kaholuamanu, Halemanu, Kokee, and Kalalau, taken in all months of the year except March, April, June, and November by O. H. Swezey, J. A. Kusche, T. Blackburn, C. N. Forbes, A. M. Adamson, and R. L. Usinger.

The allotype of Van Duzee's *Oechalia virgula* and one female paratype, both from Oahu, most certainly belong here as does another female paratype from Kauai. Mr. Van Duzee's species is readily recognizable by the characters of the male genitalia but is difficult to separate from *grisea* females. *Virgula* is confined to the Island of Hawaii according to present authentic records of males.

The type of *grisea* is not available but Burmeister gave as his locality "Von den Sandwich Inseln, Oahu," so specimens with sharp humeri like but a little shorter than "*Asop. bidens*" (= *Picromerus bidens* Linn.) from Mt. Tantalus, which is the most accessible mountain collecting place to Honolulu, have been selected as typical. Variation, as in other *Oechalias,* is very great, the humeri sometimes being a little less produced than described. They are always distinctly produced and acute, however. The color is much darker in some specimens and is tinged with ferrugineous in a few.

3. **Oechalia virescens** Usinger, new species

Allied to *grisea* and *patruelis* with humeri as strongly produced and sharp as in those species. Male genitalia small, the harpagones nearly as wide as the genital plates, as in *grisea*. Upper surface entirely or in great part suffused with green.

Head about as long as wide across the eyes, 36 : : 37, and but little shorter than pronotum on median line, 36 : : 40. Antennae nearly as long as combined lengths of pronotum and scutellum, 102 : : 106; proportion of segments one to five as 8 : 20 : 21 : 27 : 26. Rostrum reaching to hind margins of middle coxae; proportion of segments one to four as 19 : 19 : 13 : 14. Pronotum two and four-fifths as broad across humeri as long, 112 : : 40, the humeri strongly produced, acute, extending about one-eighth the total width of pronotum beyond bases of hemelytra on either side. Connexival angles slightly but distinctly produced, acute, especially on posterior segments. Under surface as in allied

species, the abdominal prolongation extending to middle of mesosternum. Femora bearing erect hairs which are one-half the thickness of femora.

Genital plates small, much less than one-third the total width of genital cup, 13::46; about two-thirds as long as wide, the dorsal margin scarcely arcuate; inner and ventral margins rounded, the outer margin distinctly produced at dorsal angle. All margins crenulate and the surface concave and distinctly tuberculate. Harpagones with well developed arms, the ectal arm a little longer than the ental arm. Width of harpagones at tips three-fourths or more the width of genital plates. Female genital plates as in related species.

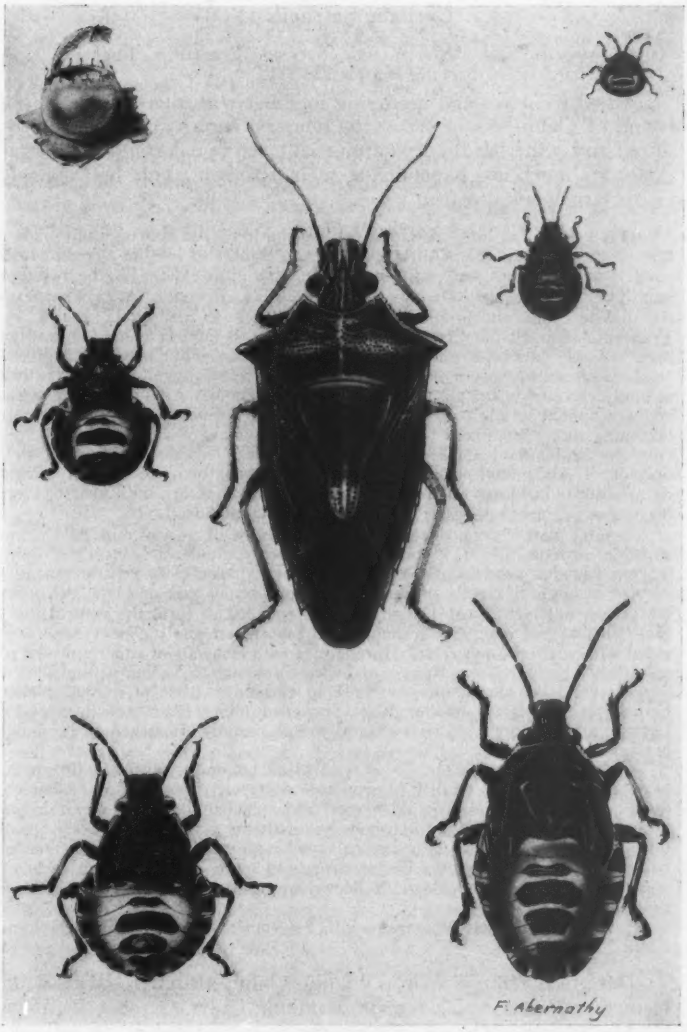
Color ochraceous with greenish punctures and with the entire inner portion of apical half of corium green, the embolium and outer half of apex of corium beyond embolium ochraceous to testaceous with only small black punctures. Apical third of scutellum white or ochraceous. Connexivum alternated with black and pale. Under surface and legs testaceous to fulvous marked with brown punctures and somewhat suffused with rufous. Antennae, tarsi, and apex of rostrum light brown, eyes darker brown.

Size: male, length 9½ mm., width 5¾ mm.; female, length 12 mm., width 7½ mm.

Holotype, male, Kokee, Kauai, August 21, 1921, O. H. Swezey. Allotype, female, Kaholuamanu, Kauai, April 22, 1920, J. A. Kusche, from the collection of W. M. Giffard. Eleven paratypes as follows: males, Kumuwela, Kauai, August 28, 1921, on *Straussia;* Halemanu, Kauai, August 18, 1921; and trail from Kokee to Kalalau, Kauai, August 5, 1925, on *Scaevola,* all collected by O. H. Swezey; Kokee, Kauai, February 1919, J. A. Kusche collector; and Alakai Swamp, Kauai, July 10, 1928, A. M. Adamson collector; females, two specimens, Kauaikinana, Kauai, August 2, 1925, O. H. Swezey collector; Kokee, Kauai, January, 1919, J. A. Kusche; Wahiawa, Kauai, June 1914, C. M. Cooke collector; Waialae River, Kauai, 4000 feet, April 14, 1920, J. A. Kusche collector, from the collection of W. M. Giffard; and Makaweli, Kauai, 2000 ft., R. C. L. Perkins. Five additional specimens from the Kusche collection are labeled "Honolulu, Oahu, June 4, 1919." Inasmuch as no other specimens of this striking species have come to notice from Oahu in all the years of collecting on that well known island and considering the fact that other Kusche material has been found to be mislabeled by entomologists in other groups, it is here assumed that these labels are erroneous. Subsequent collecting will determine whether this assumption is justified or not.

Variation is mostly confined to the extent of green coloration and to the general coloration of the under surface. All specimens are distinctly tinged with green but in one specimen this green covers the entire dorsal surface and the under surface and legs are very dark.

The sharp humeri, form of the male genitalia, and green coloration will distinguish this species from all others.



EXPLANATION OF PLATE

Oechalia patruelis (Stål) hatched egg on a Coprosma leaf, five nymphal stadia and adult from Haleauau Valley, Waianae Mountains, Oahu, the eggs collected on March 8, 1936.

4. **Oechalia patruelis** (Stål)

Arma patruelis Stål, 1859, Kongl. Svenska Fregattens Eugenies Resa Omkring Jorden. Insecter III, pp. 220-221.

Allied to *grisea* and occurring together with that species on the island of Oahu. As in *grisea* the humeral angles are strongly produced and acute but the legs are usually red in color and the harpagones are much less expanded at their tips, being only half as wide as the large genital plates.

Head nearly as long as wide, 38::40, and but little shorter than pronotum on median line, 38::42. Antennae seven-eighths as long as the combined lengths of pronotum and scutellum on median line, 98::112, the relative length of segments one to five as 8:21:18:26:25. Rostrum scarcely surpassing middle coxae, the proportion of segments one to four as 15:18:14:14. Pronotum about two and two-thirds as broad across humeri as long on median line, 113:42; humeri strongly produced, extending about one-eighth of the total width of pronotum beyond bases of hemelytra on either side, rather strongly elevated in the plesiotype but not conspicuously so in other specimens, acute. Connexival angles sharp, those of anterior segments scarcely produced, becoming more prominent posteriorly. Under surface much as in other species, the subhumeral spines prominent, propleural carinae distinct and well developed. Abdominal prolongation extending nearly or quite to front margin of mesosternum. Legs only slightly pubescent, the femora with sparse, erect bristles which are much shorter than thickness of femora.

Genital plates large, one-third the total width of genital cup, half again as wide as long, 18::11; dorsal margin evenly, moderately arcuate, inner margin rounded continuously and more strongly around to ventral margin; dorsoectal angle distinctly produced as a short broad arm or plate, the outer margin abruptly cut away behind this and rounded to form the ventral margin. All margins distinctly crenulate and the disk strongly concave and provided with scattered tubercles. Harpagones with arms about equally produced on either side, with about eight rounded teeth on surface facing genital plates. Apical width of harpagones one-half to two-thirds that of genital plates. Female apical plates subtriangular, thickened along inner apical margins. Lateral plates rounded postero-laterally and roundly thickened along inner posterior portion.

Color ochraceous to testaceous with black punctures with a suffusion of brownish ferrugineous on disk of pronotum posteriorly, on basal and subapical thirds of scutellum and often on humeri and apical margin of corium. Membrane generally infumed with fuscous but with the veins still darker. Apical third of scutellum white or occasionally ochraceous. Connexivum alternated with black, and ochraceous. Under surface ochraceous with brown to black punctures, the rostrum pale with brown apex. Antennae and legs reddish throughout.

Size: Male, length 9½ mm., width 5½ mm.; female, length 10¾ mm., width 7 mm.

Described from a male, Punaluu, Oahu, March 1, 1936, R. L. Usinger collector and a female, Lanihuli, Oahu, October 19, 1919, O. H. Swezey collector. Other material at hand is as follows: males, S. E. Koolau Mountains, Palolo, June 24, 1917, J. C. Bridwell; Pacific Heights, May 27, 1906; Tantalus, Oahu, January 2, 1905; Olympus, Oahu; Kaumuahonu, Oahu, June, 1908; Wahiawa, Oahu; Waialae Iki, Oahu, April 3, 1921; W. side of Mt.

Kaala, Oahu, June 1, 1919, all collected by O. H. Swezey; Tantalus, elevation 1300 ft., March 19, 1905, W. M. Giffard; three specimens, Tantalus, September, 1906, R. C. L. Perkins; Palolo, 1500 ft., September 14, 1906; and three males and three females reared from a single batch of eggs collected at Haleauau Valley, Oahu, March 8, 1936, R. L. Usinger.

Variation, as usual, is excessive but in all cases including three generations of the specimens from Haleauau, the humeri are sharply produced and the harpagones are much narrower at apices than the genital plates. The legs are usually bright red in color but teneral specimens, even among the Haleauau series, are sometimes fulvous. Hence females cannot always be distinguished with certainty from females of *grisea*. It is possible that the type of *grisea* may prove to be a pale legged form of this species because *patruelis* occurs in the vicinity of Honolulu. However, the male genitalia were not mentioned in those early descriptions and the legs were described as red only by Stål, so it seems logical to assume that *grisea* is the common pale form occurring on both Kauai and Oahu, while the name *patruelis* is assigned to the local red-legged Oahu form.

5. **Oechalia bryani** Usinger, new species

Closely allied to the recently described *hirtipes* and *virgula*, which are likewise confined to the island of Hawaii. However the former is ferrugineous in color and has numerous long, erect hairs on the legs and the latter has the harpagones strongly narrowed apically.

Head nearly as long as broad, 35:38; one-eighth shorter than pronotum on median line, 35::40. Antennae one-fifth shorter than width of pronotum across humeri, 93::116, about one-seventh shorter than combined lengths of pronotum and scutellum; proportion of segments one to five as 9:20:20:23:21. Rostrum reaching between intermediate coxae almost to hind margin of mesosternum; proportion of segments one to four as 19:19:15:15. Pronotum two and four-fifths as broad across humeri as long on median line, 116::41; humeri strongly produced, extending about one-eighth of the total width of pronotum beyond bases of hemelytra, the tips acute, slightly elevated and directed slightly backwards, the lateral pronotal margins moderately arcuate in front of them. Connexival angles briefly but distinctly produced on posterior segments. Abdominal prolongation reaching anterior coxae, bent slightly outward or downward at middle and briefly upward at rounded apex. Legs moderately clothed with long, erect hairs, some of those on front femora over half as long as thickness of femora.

♂ Genital plates less than one-third as wide as genital cup, 14::47; about two-thirds as long as wide, the dorsal margin evenly and more strongly arcuate than adjacent rim of genital cup, the roundness continuing more strongly but uninterruptedly along inner margins. Outer dorsal angle produced slightly beyond a right angle as a brief, rounded projection. Dorsal and inner margins at least, crenulate. Elsewhere without conspicuous projections. Disk moderately concave with ill-defined tubercles. Harpagones moderately dilated at apices, the arms quite symmetrical so that an equilateral triangle is formed at apex with about nine teeth on inner margin. Distance across apices of arms

about two-thirds the width of genital plate. Female genital plates not distinctive.

Color ochraceous with dark brown to black punctures. Punctured areas of head black and smooth areas whitish ochraceous. Pronotum with callosities pale, the punctured areas of humeri somewhat suffused with black and the apices tinged with reddish. Scutellum lightly infuscated basally and subapically, white at apex. Membrane lightly infuscated with dark brown veins. Punctured portion of connexivum black, the impunctate margins pale. Under surface ochraceous with shallow, light brown punctures, the legs, except at bases, fulvous or even slightly tinged with reddish, especially apically. Apex of rostrum and tips of claws brown. Antennae fulvous basally and ferrugineous apically.

Size: Male, length 9½ mm., width 5½ mm.; female, length 11 mm., width 6½ mm.

Holotype, male, allotype, female, and five male and five female paratypes, Hookomo, South Slope of Mauna Kea, 8500 feet elevation, August 9, 1935, on *Sophora,* R. L. Usinger.

This species is smaller than other species from Hawaii with the abdominal prolongation longer, the legs less hairy, and the humeri bent slightly but distinctly backwards. Other specimens which apparently belong here include seven specimens, Nauhi Gulch, Hawaii, 5000 to 6000 ft., September 30, 1931, on ohia lehua, O. H. Swezey and F. X. Williams, and four specimens, Kahuku, Kau, Hawaii, January 15, 1917, W. M. Giffard collector. Apparently the species is confined to Mauna Kea and its environs.

It gives me great pleasure to name this species after Mr. E. H. Bryan, Jr., with whom I was associated during the first days of collecting on the Hawaiian Academy of Science Mauna Kea Expedition at which time the type series was collected.

6. **Oechalia acuta** Usinger, new species

A large dark colored species with straight, acute humeral spines as in *hirtipes* but with less hairy legs, slightly different male genitalia, and with ferrugineous color.

Head nearly as long as broad, 43 : : 44, distinctly shorter than pronotum on median line, 43 : : 50. Antennae about one-twelfth shorter than width of pronotum across humeri, 121 : : 132; nearly as long as combined lengths of pronotum and scutellum, 121 : : 128; proportion of segments one to five as 10 : 25 : 27 : 33 : 26. Rostrum reaching between middle coxae nearly to hind margin of mesosternum; proportion of segments one to four as 22 : 22 : 18 : 17. Pronotum about two and two-thirds as wide across humeri as long on median line, 132 : : 50; humeri strongly produced, acute, extending about one-ninth the total width of pronotum beyond bases of hemelytra, the margin of pronotum in front of them feebly arcuate. Connexival angles briefly produced on posterior segments. Abdominal prolongation relatively short, reaching only to middle of mesosternum, bent outward or downward apically. Legs only sparsely hairy, the erect hairs of the femora scarcely half as long as greatest thickness of femora.

Genital plates less than one-third as wide as genital cup, 15 : : 52, about two-thirds as long as wide, 10 : : 15; top margin only feebly arcuate, inner

margin subangulately rounded, outer dorsal angle produced slightly beyond a right angle, the outer side straight, inner margin with a series of peg-like tubercles, elsewhere crenulate with the disk moderately concave and irregularly tuberculate. Harpagones moderately dilated apically, two-thirds as broad across apices of arms as width of genital plates, 10::15; arms about equally developed, though the ventro-ectal margin at apex is slightly arcuate; inner face with about six teeth. Female genital plates not distinctive.

Color whitish ochraceous but broadly suffused with dark brown to black including punctures, punctate areas of head, pronotal callosities and more or less of disk near and on the humeri, scutellum basally and subapically, corium except laterally and apically, and punctured portion of corium. Membrane generally infuscated with darker veins. Apex of scutellum white. Under surface pale with brown punctures, the legs fulvous, tip of rostrum and apices of claws brown, antennae pale brown basally and light ferrugineous apically.

Size: male, length 11½ mm., width 6½ mm.; female, length 12 mm., width 7¼ mm.

Holotype, male, and allotype, female, Kilauea, Hawaii, August 18, 1935, R. L. Usinger collector. Many additional, more or less typical specimens are at hand, all collected at Kilauea by Giffard, Bryan, Clark, Swezey and Timberlake. Additional specimens from South Kona and from Waimea, upper Hamakua Ditch Trail and elsewhere in or near the Kohala Mtns. are indistinguishable, on the basis of present criteria, from the Kilauea specimens.

The four species of *Oechalia* with acute humeri which occur on Hawaii overlap somewhat in range. Thus *hirtipes, virgula,* and *acuta* occur at Kilauea. *Hirtipes* and *acuta* appear to be close allies with similar straight humeri and short abdominal prolongation, *hirtipes* having diverged with its hairy legs and ferrugineous color from the more widespread *acuta*. *Bryani* and *virgula* are likewise close, both being somewhat smaller with the humeri bent slightly backwards and the abdominal prolongation relatively long. *Bryani* appears to be confined to the environs of Mauna Kea while *virgula* exhibits a spotted distribution.

7. **Oechalia virgula** Van Duzee

Oechalia virgula Van Duzee, 1936, Proc. Haw. Ent. Soc., 9:220.

Very similar in general appearance to *grisea* and *patruelis* with similar sharp humeri but with fulvous or paler legs bearing longer and more numerous erect femoral hairs and with the harpagones very slender, actually narrowed or compressed at the tip rather than expanded as in all other known Oechalias except *similis*.

Head nearly as long as broad, 38::40, and only slightly shorter than pronotum on median line, 38::43. Antennae about four-fifths as long as combined lengths of pronotum and scutellum, 96::118; proportion of segments one to four as 9:20:20:25:22. Rostrum reaching middle of intermediate coxae, the proportion of segments one to four as 19:17:15:16. Pronotum nearly three times as broad as long, 121::43; humeri strongly produced and slightly elevated, extending one-eighth of the total width of pronotum beyond bases of hemelytra, acute and directed slightly backward, the front

margin of each humerus humped. Puncturation of upper surface as in related species except on the scutellum where the punctures are somewhat sparser, leaving frequent smooth areas more than one puncture width in extent laterally and medially. Connexival angles feebly produced anteriorly, more distinctly so posteriorly, acute. Abdominal prolongation reaching nearly or quite to front margin of mesosternum. Femora relatively thickly beset with erect hairs or bristles at least some of which are one-half to two-thirds as long as thickness of femora.

Genital plates a little more than one-third as wide as genital cup, 18::51; suboval in outline, being over two-thirds as long as wide, 14::18; dorsal margin feebly but evenly arcuate, inner and ventral margins continuously rounded, and outer margin so broadly and roundly produced anteriorly that it does not appear as a distinct arm or projection, the outer margin broadly emarginate posteriorly. All the margins irregularly crenulate and the disk very strongly concave and distinctly tuberculate. Harpagones asymmetrical at apices, the ectal arms entirely wanting, resulting in an obliquely truncate apex with only about five teeth on the sloping inner face; width at apex about one-third the width of genital plates, 7::18. Female genital plates scarcely differing from those of allied species, only the lateral plates appearing slightly less rounded and more produced.

Color ochraceous with black punctures and generally suffused dark brown to black on humeri, at base of scutellum medially and more lightly so on subapical third and on inner apical portion of corium. Membrane subhyaline with the veins distinctly brown. Punctate portion of connexivum entirely black, the narrow marginal smooth area ochraceous with black posterior angles. Under surface ochraceous or paler with fuscous punctures, the smooth areas of mesosternum, internal sides of genital cup, genital plates and apices of harpagones brown. Legs and antennae rather generally fulvous, appearing somewhat paler basally and darker fulvous apically. Only the tarsal claws brown. Rostrum ochraceous with brown apex.

Size: male, length 10½ mm., width 5½ mm.; female, length 13½ mm., width 7½ mm.

Described from the male holotype, Puuwaawaa, North Kona, Hawaii, 3,700 ft., August 25, 1917, W. M. Giffard collector. Male paratypes are at hand as follows: three specimens, same data as type; four specimens, Kilauea, Hawaii, 4,000 feet, January 19, 1917, W. M. Giffard collector from the Frederick Muir collection; one specimen same as the latter but taken on January 14; and two specimens from the dry forest, Hawaii, January, 1917, Frederick Muir collector. Material at hand other than paratypes includes four males as follows: Kilauea, Hawaii, June 27, 1917, on koa, O. H. Swezey; Kilauea, Hawaii, April, 1927, N. Krauss; Kilauea, 29 miles, 4,000 feet, August 21, 1917, W. M. Giffard; and one specimen without locality but collected on *Myoporum*. A single female is at hand from Kilauea, Hawaii, June 27, 1917, collected on *Dodonaea* by O. H. Swezey. All of the males can be identified with certainty because of the entirely unique form of the harpagones. They are all from the island of Hawaii. Hence it seems certain that Mr. Van Duzee's allotype from Oahu pertains to the common Oahu species with sharp humeri and fulvous legs, namely *grisea*. Females of this species unfortunately can be identified safely only by association with the distinctive males. The single female listed above

is the only one which I have been able to place with certainty as this species.

8. **Oechalia hirtipes** Van Duzee

Oechalia hirtipes Van Duzee, 1936, Proc. Haw. Ent. Soc., 9: 221-222.

A species with strongly produced, acute humeri and a general ferrugineous color over most of the body.

Head about as long as broad, 43::42, and only slightly shorter than pronotum on median line, 43::45. Antennae nearly as long as combined lengths of pronotum and scutellum, 116::121; proportion of segments one to five as 9:21:27:30:29. Rostrum reaching middle of intermediate coxae; the proportion of segments one to four as 22:23:15:15. Pronotum nearly three times as broad across humeri as long on median line, 130::45; the humeri strongly, evenly produced, acute, extending one-eighth of the width of pronotum beyond bases of hemelytra and only slightly elevated. Abdominal prolongation reaching about to middle of mesosternum. Legs rather densely hairy, the femora with numerous erect hairs over two-thirds as long as the thickness of femora.

Genital plates less than one-third the total width of genital cup, 15::51; half again as wide as long, 15::10; dorsal margin only feebly arcuate, inner margin produced into a 45° angle and then continuing sinuately along ventral margin to outer ventral angle which is subrounded. Outer margin produced dorso-laterally as a broad, rounded lobe. All except outer margin crenulate, the disk concave and distinctly tuberculate. Harpagones distinctly dilated apically, the outer arms most strongly produced. Width across tips of arms nearly two-thirds the width of a genital plate, 9::15, the side nearest genital plate with about nine rounded teeth. Female genitalia much as in related species, the apical plates slightly less strongly produced and the lateral plates very evenly rounded posteriorly.

Color ferrugineous with black punctures, the humeri black, the base and subapex of scutellum dark with apex very pale. Membrane slightly infuscated with the veins dark brown. Punctured portion of connexivum black with paler smooth margins. Under surface including legs, antennae, and rostrum ochraceous, but generally tinged throughout with ferrugineous or rufous and with fuscous punctures.

Size: male, length 11 mm., width 6½ mm.; female, length 13 mm., width 7 mm.

Described from the male and female holotype and allotype from Kilauea, Hawaii, February 24, 1919, O. H. Swezey collector. The paratypes are a heterogeneous mixture of females which are treated elsewhere under the appropriate species. This species is very distinct from all others known to me. The precise limits of variability cannot be determined without a great deal more material.

9. **Oechalia ferruginea** Usinger, new species

This is the only member of the group of species with subrounded humeri known to occur on Hawaii. The humeri are more strongly produced than in other members of this group and the color is ferrugineous.

Head as long as wide across eyes, shorter than pronotum on median line, 44::51. Antennae much shorter than combined lengths of pronotum and scutellum, 98::135; proportion of segments one to five as 10:24:21:23:20. Rostrum reaching middle coxae; proportion of segments one to four as 22:23:17:16. Pronotum nearly two and one-half times as broad across humeri as long, 124::51, the humeri moderately, angularly produced, subrounded at apices, extending one-twelfth of the total width of pronotum beyond bases of hemelytra on either side. Abdominal prolongation extending nearly to front coxae, bent downward and then briefly reflexed at rounded apex. Femora sparsely clothed with erect hairs which are one-half as long as thickness of femora. Female genitalia scarcely distinctive, the apical plates relatively slender.

Color rather uniformly ferrugineous with black punctures, scutellar and hemelytral disks nearly concolorous, the pale area on apex of scutellum scarcely discernible. Membrane more or less infuscated with the veins darker. Connexivum ochraceous along extreme lateral margins, the punctate region alternated with black and ferrugineous. Under surface and legs reddish, more or less marked with brown or black. Antennae basally and rostrum brownish, the latter darker brown apically.

Size: female, length 11½ to 12½ mm., width 6¼ to 7 mm.

Holotype, female, Kilauea, Hawaii, 4,000 feet, June 8, 1918, W. M. Giffard. Paratypes, two females, Kau Road, Hawaii, January 16, 1917, W. M. Giffard collector, and one female, Kilauea, Hawaii, 3,000 feet, December, 1905.

Four of the specimens before me bear Van Duzee paratype labels of *Oechalia hirtipes* but, as in the case of the type series of *virgula,* various species were confused under a single name. *Ferruginea* differs from the type specimens of *hirtipes,* which are before me, in its short, subrounded humeri, ferrugineous color, long abdominal spine, and entirely unique proportions of antennal segments, this being the only known species with the second segment longest and fifth segment shortest. In general it is not advisable to name Oechalias on the basis of females alone, but the present species is so distinctive that there can be little doubt as to its identity.

A single female from Kaholuamanu, Kauai, April, 1920, J. A. Kusche, likewise bearing a paratype label of *hirtipes,* is closely allied to *ferruginea* and may be identical with it. The antennal proportions are similar and the abdominal spine is likewise strongly produced. The ferrugineous color is much less pronounced, however. In the absence of male specimens it seems best to reserve judgment on this interesting specimen.

10. **Oechalia pacifica** (Stål)

Arma pacifica Stål, 1859, Kongl. Svenska Fregattens Eugenies Resa Omkring Jorden. Insekter III, p. 221.

Oechalia pacifica Stål, 1870, Enum. Hemipt., 1: 59.

Oechalia pacifica, White, 1878, Ann. Mag. Nat. Hist., (5) 1: 367.

Oechalia pacifica, Kirkaldy, 1909, Proc. Haw. Ent. Soc., 2: 83, pl. 2, fig. 2.

Head nearly as long as broad, 39::40; shorter than pronotum on median line, 39::43. Antennae subequal to width of pronotum across humeri; one-eleventh shorter than combined lengths of pronotum and scutellum, 102::112; proportion of segments one to five as 9:21:21:27:24. Rostrum reaching between middle coxae, the proportion of segments one to four as 19:20:15:15. Pronotum two and two-fifths times as wide across humeri as long as median line, 102::43; humeri briefly, angulately produced, reaching one-fourteenth of the total width of pronotum beyond bases of hemelytra, the apices obtusely rounded and not at all elevated. Abdominal prolongation reaching front coxae, bent downward on apical half, its tip rounded and a little enlarged on upper side. Femora sparsely clothed with erect hairs, which are shorter than greatest thickness of femora.

Genital plates relatively large, two-fifths as wide as total width of genital cup, 19::47; about three-fourths as long as wide; dorsal margin rounded about as the dorsal margin of genital cup, inner margin more strongly, rather evenly rounded except for a feeble subangular point at middle, outer dorsal angle very broadly and strongly produced, the projecting plate rounded, ventral margin below this rounded and provided with three very prominent teeth. Margins crenulate and disk strongly concave with numerous distinct tubercles. Harpagones strongly asymmetrical, the ental arms produced upward almost as a continuation of inner edges of harpagones while the ectal arms are abruptly bent downward; width measured obliquely across apices of harpagonal arms about three-fifths that of genital plates, 12::19; inner face with about eight teeth.

Color brownish ochraceous more or less suffused with ferrugineous, the punctures dark brown to black. Head with the usual pale areas and with punctate areas black. Pronotum ochraceous along anterior margin, surrounding and just behind callosities and broadly along lateral margins though narrowing near humeri. Humeri dark piceous brown. Scutellum more or less suffused with dark brown on basal and subapical fourths, white apically. Membrane generally infuscated with darker brown veins. Connexivum pale along narrow impunctate margins except at sutures, often distinctly alternated with pale at middle of punctate portions of segments. Under surface pale with brownish punctures, the legs ochraceous with obscure brown spots, tarsi darker with black tipped claws. Antennae brownish basally becoming ferrugineous apically.

Size: male, length 10 mm., width 5 mm.; female, length 11½ mm., width 6 mm.

Described from a male collected by Blackburn on Oahu, which agrees perfectly with Stål's description, and from a female, Tantalus, Oahu, elev. 1,300 ft., April 16, 1905, W. M. Giffard. There can be little doubt as to the identity of this species though Kirkaldy (1909) confused it hopelessly, first as a variety of *grisea* with sharp humeri (plate 2, fig. 3) and then (on the following page) as a synonym of *grisea* with blunt humeri. Stål's description is very clear and this is the only form occurring on Oahu to which it might pertain. Ten additional specimens are at hand from both lowlands and highlands of the Waianae and Koolau Mountains. Variation is excessive, some specimens being quite pale and others generally infuscated while the size ranges up to a large female 13 mm. long and 7 mm. wide. All agree, however, in possessing blunt humeri, large, strongly convex genital plates with broad dorso-lateral plate-like projection, and strongly asymmetrical harpagones.

Material from other islands is equally characteristic, but even more variable as follows: Kauai, nineteen specimens mostly from the vicinity of Kokee collected at scattered intervals throughout the year. Size, coloration, and genitalia as in Oahu forms. Molokai, four large dark females from Kainalu and Puu Kolekole. Lanai, two males and a female, rather dark, of moderate size with genitalia as in Oahu forms. Maui, eighty specimens varying from small to exceedingly large and mostly rather dark. Localities range from lowlands to highlands and include both West and East Maui. The genital plates are less strongly concave and the harpagones are less strongly asymmetrical but the differences are so slight that they merely suggest the development of an incipient subspecies.

11. **Oechalia similis** Usinger, new species

Very similar to *pacifica* but with male harpagones slender, beveled to a sharp edge at apices as in *virgula* from Hawaii.

Head shorter than broad including eyes, 38::41, and still shorter than pronotum on median line, 38::43. Antennae about one-sixth shorter than greatest width of pronotum, 92::108; proportion of segments one to five as 9:20:18:23:22. Rostrum reaching between intermediate coxae to hind margin of mesosternum; proportion of segments one to four as 18:18:15:15. Pronotum two and one-half times as broad as long on median line, 108::43; humeri produced about one-fourteenth of the entire width of pronotum beyond bases of hemelytra, the lateral margins just in front of humeri arcuate and a little elevated, the margins behind briefly straight and then arcuate, the actual apices depressed and angulate but narrowly rounded at tips. Dorsum punctured much as in other species but with base and apex of scutellum broadly impunctate. Abdominal prolongation very long, reaching at least to hind margin of prosternum, bent outward or downward toward the apex. Femora sparsely beset with erect hairs which are less than half the thickness of femora.

Genital plates relatively large, three and one-third times as wide as total width of genital cup, about two-thirds as long as wide, the upper edge feebly and the inner edge strongly rounded. Dorso-lateral angle rather strongly produced and then gradually narrowed below to ventro-lateral angle. Genital plates unusually deeply concave, the edges crenulate as usual and the disks relatively densely covered with prominent, sharp tubercles. Harpagones without distinct arms, the apices simply appearing triangular with about five teeth on inner face. Width across ectal and ental angles less than half the width of genital plates, 6::15. Female genital plates narrower and more strongly produced than in *pacifica*, the basal plates in particular with hind margins straight and directed obliquely, forming acute angles at inner apices.

Color much as in dark *pacifica*, dark brown to black with dark punctures, with longitudinal head stripes, smooth areas surrounding eyes, median portion of anterior margin and anterior, crenulate halves of lateral margins ochraceous. Elsewhere the pronotal disk at middle and the scutellar disk laterally on basal half are ochraceous while the apical fourth of scutellum is white. Membrane brownish hyaline with dark brown veins. Beneath generally pale fulvous to testaceous with shallow light brown punctures, the legs fulvous with tips of claws black. Antennae fulvous on smooth basal half, then tinged with ferrugineous. Rostrum embrowned at apex. Eyes dark brown.

Size: male, length 9¾ mm., width 5⅓ mm.; female, length 12 mm., width 6 mm.

Holotype, male, and allotype, female, Kula Pipe Line, Maui, 4,500 ft. elev. April 8, 1932, Owen Bryant collector.

This interesting species is somewhat parallel to *virgula* of Hawaii, a species which is scarcely distinguishable from *acuta* except for the narrowed apices of harpagones. The present case represents a similar phenomenon in the group of *Oechalias* with blunt humeri which are so common on the neighboring island of Maui.

12. **Oechalia suehiroae** Usinger, new species

Oechalia kaonohi, Van Duzee, 1936, Proc. Haw. Ent. Soc., 9:221. (*nec* Kirkaldy).

Allied to *pacifica* with similar rounded apices of humeri but brownish ferrugineous in color and with the male genital plates scarcely wider than the strongly dilated apices of harpagones.

Head nearly as long as broad across eyes, 39::40; distinctly shorter than pronotum on median line, 39::44. Antennae (measured in the Iao Valley specimen) one-tenth shorter than width of pronotum across humeri, 99::108; proportion of segments one to five as 11:21:21:25:21. Rostrum (on holotype) reaching between intermediate coxae nearly to hind margin of mesosternum; proportion of segments one to four as 19:19:14:14. Pronotum two and one-half times as broad across humeri as long on median line, 108::44; humeri moderately, angularly produced, extending for about one-sixteenth the total width of pronotum beyond the bases of hemelytra, rounded at apices and not at all elevated. Puncturation rather uniform over the entire upper surface including apical fourth of scutellum, the punctures of hemelytra somewhat finer and more numerous and the connexival punctures, as usual, very fine and dense. Abdominal prolongation bent abruptly outward at level of middle coxae, rounded and turned briefly upward at extreme apex, reaching level of anterior coxae. Hairs of femora (taken from Iao Valley male) erect and rather numerous but shorter than half the thickness of femora.

Genital plates small, one-fourth as wide as entire genital cup, 13::51; about three-fourths as long as wide; dorsal margin nearly straight, inner margin rather strongly but evenly rounded, outer margin briefly rounded at a subacute dorso-lateral angle, then concave just below this and rounded at ventro-lateral angle; margins all crenulate as usual but concave disk less conspicuously tuberculate. Harpagones rather strongly dilated apically, about five-sixths as wide across apices of arms as width of genital plate, 11::13; the ectal arm longer, more elevated, and more slender than the ental arm; inner face with about nine smooth teeth.

Color rather uniformly brownish-ferrugineous with dark brown to black punctures, the punctate areas of head suffused with black as also the inner base of membrane adjacent to apex of scutellum, and the punctate portion of connexival segments except laterally at middle of each segment. Membrane subhyaline, the veins dark brown to black. Middle of anterior margin, serrate anterior halves of lateral margins of pronotum and smooth areas surrounding eyes ochraceous to ivory white. Antennae and rostrum brownish ferrugineous becoming darker apically. Abdominal prolongation broadly ivory white at tip.

Size: male, length 9¾ mm., width 5½ mm.; female, length 10½ mm., width 5⅝ mm.

Holotype, male, Haleakala, Maui, 5,000 ft., April, 1894, R. C. L. Perkins. Allotype, female, Haleakala, Maui, July 22, 1919, elev. 5,800 ft., P. H. Timberlake. One female paratype, Haleakala, Maui, over 5,000 ft., October, 1896, R. C. L. Perkins. An additional female which is somewhat larger with more coarsely punctured scutellum marked with black basally and subapically and paler at apex, with the connexivum distinctly alternated and the membrane darker, is at hand from Haleakala, 5,000 ft., July 19, 1919, P. H. Timberlake, and an apparently typical male was collected by Mr. Swezey at Iao Valley, Maui, August 8, 1918 (listed by Van Duzee as *kaonohi*).

Although closely related to *pacifica,* this is a very distinct species. It is recognizable at a glance because of its ferrugineous color while the smaller genital plates and relatively broader harpagones will readily separate it structurally. The species is gratefully dedicated to Miss Amy Suehiro who so patiently carried on the rearing of Oechalias through three generations, thus establishing the limits of variation within a single species.

13. **Oechalia swezeyi** Usinger, new species

Allied to *pacifica* and *ferruginea* with similar blunt humeri but with the genital plates very small, the harpagones nearly symmetrical and about three-fourths as wide across apical arms as the width of plates, and the color of the body rather uniformly pale, whitish testaceous with brown punctures.

Head nearly as long as broad across eyes, 38::40; about one-fifth shorter than pronotum on median line, 38::48. Antennae distinctly shorter than combined lengths of pronotum and scutellum, scarcely shorter than pronotal width across humeri, 106::110; proportion of segments one to five as 8:22:24:27:25. Rostrum reaching about to middle of intermediate coxae, proportion of segments one to four as 22:20:15:16. Pronotum two and one-third times as broad across humeri as long on median line, 111::48; humeri moderately produced into a brief, rounded projection, extending about one-sixteenth of the total width of pronotum beyond the bases of hemelytra. Dorsal surface evenly, relatively finely punctate, the punctures even extending lightly onto apical fourth of scutellum except along median line. Abdominal prolongation nearly straight, attenuated apically and reaching a little beyond middle of mesosternum. Femora sparsely clothed with erect hairs which are less than half as long as thickness of femora.

Genital plates small, about one-fourth as wide as genital cup, 12::46; about three-fourths as long as wide, the dorsal margin arcuate following contour of dorsal margin of genital cup, obtuse angulately deflected at inner dorsal angle and obtusely angulate at middle of inner margin. Outer dorsal angle roundly produced, then concave below this and rounded at outer ventral angle. All the margins are irregularly crenulate and the surface is concave and irregularly tuberculate. Harpagones with well developed, rather symmetrical arms, the ectal arm slightly longer and more slender than the ental arm. Width across apices of harpagonal arms five-sixths as great as width of genital plates. Female genital plates scarcely distinctive, the apical plates rather more broadly rounded and less produced.

Color white or testaceous with brown punctures, the eyes, punctures around ocelli, extreme tips of humeri, inner posterior area of connexivum, tips of claws and apex of rostrum dark brown. Membrane suffused with dark brown at inner base, elsewhere clear hyaline with brown veins. Callosities light brown. Pale areas of dorsum sometimes slightly tinged with pink or ferrugineous. Antennae smooth and light brown on basal half, roughened and becoming ferrugineous apically.

Size: male, length 10¼ mm., width 5⅓ mm.; female, length 11 mm., width 5⅔ mm.

Holotype, male, allotype, female, and one male paratype, Kanoa, Molokai, January 25, 1929, O. H. Swezey collector. A female taken on Maui by Koebele and a female, Honolulu, Oahu, 2,000 ft., April, 1892, R. C. L. Perkins, appear to be perfectly typical.

This species may be separated from all others by its briefly produced, rounded humeri, pale coloration, and small genital plates with relatively strongly dilated harpagones. It is a pleasure to dedicate this distinctive species to Mr. O. H. Swezey through whose assiduous collecting so many Oechalias have been assembled during the past thirty years.

14. **Oechalia kaonohi** Kirkaldy

Oechalia grisea, Swezey, 1905, H.S.P.A., Exp. Sta. Div. Ent., Bull. 1, pt. 7, p. 236, pl. 17, fig. 5.

Oechalia kaonohi Kirkaldy, 1909, Proc. Haw. Ent. Soc., 2: 82-83, Pl. 2, fig. 1 and text fig. b.

Oechalia kaonohi, Perkins, 1913, Fauna Haw., Intro., p. 191.

Oechalia grisea, Williams, 1931, Handbook of the Insects and other Invertebrates of Hawaiian Sugar Cane Fields. Honolulu, pp. 96-97, plate XIII, figs. 5 and 7.

Oechalia grisea, Swezey, 1936, Bull. Exp. Sta. H.S.P.A., Ent. Series, 21: 91, plate 5, figs. 5 and 7.

A long, slender species with scarcely produced, roundly angular humeri.

Head scarcely longer than broad across the eyes, 42::41; slightly shorter than pronotum on median line, 42::45. Antennae one-sixth shorter than combined lengths of pronotum and scutellum, 103::122; proportion of segments one to five as 9:22:24:25:23. Rostrum extending between middle coxae to hind margin of mesosternum; proportion of segments one to four as 22:22:16:16. Pronotum scarcely more than twice as broad across humeri as long, 95::45; humeri very slightly produced, extending only one thirty-second of the width of pronotum beyond bases of hemelytra, roundly angulate and only moderately elevated. Subhumeral spines weakly developed. Abdominal prolongation subappressed or at least less strongly divergent than in related species, reaching nearly to front margin of mesosternum. Femoral hairs relatively short, less than half as long as thickness of femora, and comparatively sparse.

Genital plates slightly over one-third as wide as genital cup, 18::52; and two-thirds as long as wide; dorsal margin rather evenly arcuate following the curve of dorsal rim of genital cup, then more abruptly rounded and a little sinuate at inner dorsal angle below which is a rounded projection, ventral margin rather evenly arcuate and feebly, roundly emarginate laterally beneath produced dorso-lateral area; all margins irregularly crenulate and the disk moderately concave and sparsely covered with small, rounded tuber-

cles. Harpagones asymmetrical at apices, the ectal arms more slender and longer than the ental arms; the arms strongly dilated, the distance across apices nearly as great as width of genital plates, 17::18; inner edge with about eleven rounded teeth.

Color ochraceous with black punctures and with a metallic tinge to the suffused black areas of head. Suffused with dark brown on humeri, and basal and subapical fourths of scutellum, the apical fourth of scutellum, sublateral vein and lateral and apical margins of corium and lateral margins of connexivum posteriorly ivory-white. Punctate portions of connexivum pale laterally and posteriorly, the postero-lateral angles minutely black. Membrane brownish subhyaline with dark brown veins. Under surface pale ochraceous with light brown punctures becoming darker brown on propleura. Legs except basally and at joints fulvous. Antennae fulvous on basal half, roughened and ferrugineous apically. Rostrum fulvous at tip.

Size: male, length 11 mm., width 4½ mm.; female, length 11½ mm., width 4¾ mm.

The male holotype, Naalehu, Hawaii, May 4, 1905, is before me. It has been badly damaged by dermestids so that only the abdominal prolongation, fragments of the middle legs, and the dorsal surface of scutellum and hemelytra remain. The genital capsule is mounted on a card on the same pin and is perfect. The above description was taken from a male, Pahala, Hawaii, May 21, 1915, and a female, Puna, Hawaii, 1,500 feet. Another female is at hand from Hawaii collected by the Rev. T. Blackburn and a female and nymph from Olaa, Hawaii, July, 1903, are mounted on a card, the nymph with its beak inserted in a sugar cane leafhopper. Still another apparently typical female was collected by Blackburn on Maui while a slightly smaller but apparently typical female is at hand from Lihue, Kauai, March 31, 1912.

Kaonohi is one of the most distinctive species in the genus, the long slender form and very broad harpagonal arms being unique among the species of *Oechalia* known to me. This is the species which Swezey (1905) studied and illustrated under the name *grisea*. Kirkaldy later described it as a new species but the original name, *grisea,* has since been used by Williams (1931) and Swezey (1936) who reprinted the original plate of illustrations. I can find no specimens of this species collected during the past twenty-five years.

BIBLIOGRAPHY

Baker, A. D. 1931. A Study of the male genitalia of Canadian species of Pentatomidae. Canad. Jour. Res., Ottawa, 4: 148-179, 21 figs.

Bergroth, E. 1891. Contributions à l'étude des Pentatomides. Revue d'Entomologie, 10: 200-208.

Blackburn, T. 1888. Notes on the Hemiptera of the Hawaiian Islands. Proc. Linn. Soc. N. S. Wales (2) 3: 343-354.

Boisduval, J. A. 1835. Voyage de l'Astrolabe, pendant les années 1826-29, faune entomologique de l'ocean Pacifique, 2: 630, pl. II, fig. 9.

Burmeister, H. C. C. 1834. Rhyngota seu Hemiptera. Beiträge zur Zoologie gesammelt auf einer Reise um die Erde, von Dr. F. J. F. Meyen. Nova Acta Acad. Leop., XVI, suppl. p. 293.

Guérin-Méneville, F. E. 1838. L'entomologie du voyage autour du monde sur la Corvette la Coquille. Zool. 2: 166, pl. 11, fig. 9.
Gulde, J. 1919. Die Larvenstadien der Asopiden. Deutsch. Ent. Ztschr., 1919: 45-55, 3 Abd.
Heymons, R. 1906. Über einen Apparat zum Öffnen der Eischale beiden Pentatomiden. Ztschr. f. wiss. Insektenbiol., 2: 73-82, 2 figs.
Kirkaldy, G. W. 1902. Fauna Hawaiiensis. Hemiptera. 3: 93-174, pls. IV and V.
1907. Biological Notes on the Hemiptera of the Hawaiian Isles. No. 1. Proc. Haw. Ent. Soc., 1: 135-161, 4 figs.
Kirkaldy, G. W. 1908. A list of the described Hemiptera (excluding Aleyrodidae and Coccidae) of the Hawaiian Islands. Proc. Haw. Ent. Soc., 1: 186-208, plate 4.
1909a. Notes on the Hemipterous genus *Oechalia*. Proc. Haw. Ent. Soc., 2: 82-84, plate 2 and figures.
1909b. Catalogue of the Hemiptera (Heteroptera) with biological and anatomical references, lists of food plants and parasites, etc. Vol. I. Cimicidae. Berlin. xl + 392 pp.
1910. Fauna Hawaiiensis. Supplement to Hemiptera. 2: 531-599.
Kirkland, A. H. 1897. The species of Podisus occurring in the United States. Rept. Massachusetts St. Bd. Agric., 45: 412-438, pl. 1.
Knight, H. H. 1923. Studies on the life history and biology of Perillus bioculatus Fabricius, including observations on the nature of the color pattern. 19th Rept. St. Ent. Minnesota, for 1922: 50-99, pls. 1-3, fig. 1.
Mayr, G. L. 1868. Hemiptera, in Reise der Osterreichischen Freggate Novara um die Erde in den Jahren 1857, 1858, 1859. Zool. Teil, II, Abt. 1, p. 32.
Perkins, R. C. L. 1913. Fauna Hawaiiensis. Introductory Essay on the Fauna. Vol. I, Part VI, pp. i-ccxxviii, 16 plates.
Schouteden, H. 1906. Genera Insectorum. Heteroptera. Fam. Pentatomidae. Subfam. Asopinae (Amyoteinae). Fasc. 52: 1-82, 5 pls.
Schumacher, F. 1910-1911. Beiträge zur Kenntnis der Biologie der Asopiden. Ztschr. f. wiss. Insektenbiol., 6: 263-266, 376-383, 430-437; 7: 40-47, 15 figs.
Stål, C. 1859. Kongl. Svenska Fregattens Eugenies Resa Omkring Jorden. 1851-1853. Stockholm, Norstedt, 1858. 4. Insekter, III, pp. 219-298, Tab. 2.
1862. Hemiptera Mexicana. Stettin. Ent. Zeit., 23: 93, footnote.
1864. Hemiptera Africana. Stockholm. 1: 1-256.
1870. Enumeratio Hemipterorum. Hemiptera. I. Kongl. Svenska Vet. -Akad. Handl., Band. 9, No. 1, pp. 1-232.
Swezey, O. H. 1905. Leaf-Hoppers and their Natural Enemies. Pt. VII. Orthoptera, Coleoptera, Hemiptera. Rept. Exp. Sta. H.S.P.A. Div. of Ent. Bull. 1: 211-238, 4 plates.
1936. Biological Control of the Sugar Cane Leafhopper in Hawaii. Bull. Exp. Sta. H.S.P.A., Ent. Series, 21: 55-101, 23 figs., 6 plates.
Van Duzee, E. P. 1936. A Report on Some Heteroptera from the Hawaiian Islands, with Descriptions of New Species. Proc. Haw. Ent. Soc., 9: 219-229.
Walker, F. 1867. Catalogue of the specimens of Hemiptera Heteroptera in the collection of the British Museum. London, Part 2.
White, F. B. 1878. Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian Islands by the Rev. T. Blackburn, No. 2. Ann. Mag. Nat. Hist. (5) 1: 365-374.
Williams, F. X. 1931. Handbook of the Insects and Other Invertebrates of Hawaiian Sugar Cane Fields. Honolulu, 400 pp. 41 plates, 190 figs.

A New Amblycnemus from the Caroline Islands (Coleoptera: Curculionidae)

BY ELWOOD C. ZIMMERMAN
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(Presented at the meeting of October 14, 1940)

The genus *Amblycnemus* was erected in 1931 by Sir Guy Marshall for the reception of a Samoan anthonomine weevil (Insects of Samoa, *4*(5): 265-268, fig. 6). I recently described a second species from the island of Guam, Marianas Islands (Curculionidae of Guam, Bishop Mus. Bull. in press). Herewith is presented the description of a third species represented by specimens from the Caroline Islands collected during the course of Bishop Museum's Micronesian expedition of 1935-36.

The femora of the genotype are simple, but on the Guam species and the one here described, the femora are distinctly toothed.

The types of the new species are in Bishop Museum.

Amblycnemus dentifer, new species.

Derm testaceus to ferrugineous, usually darkest beneath; elytra either concolorous or with some vague dark maculae; vestiture white or pale yellow.

Head with the crown coarsely reticulate, punctate, each puncture bearing a slender, curved, lanceolate, decumbent seta directed toward the interocular area; interocular area almost as broad as an eye, viewed from the front, with a row of decumbent, dorsally directed setae, similar to those on the crown, along the inner margin of each eye. *Rostrum,* measured from the anterior edge of an eye to the apex of the epistome, one fifth longer than the pronotum in the female, not quite one fifth longer in the male; finely reticulate and moderately shiny in the female, coarsely reticulate throughout in the male; expended beyond the antennae in both sexes, the striae each bearing a row of medianly directed setae, the setae more numerous on the male; mandibles tridentate. *Antennae* inserted at the apical fourth in the male and between the apical fourth and the third in the female; the scape as long as the six funicular segments plus one half of the club; first funicular segment approximately as long as 2 plus 3, 2 as long as 3 plus one half of 4, 3 almost as long as 4 plus 5, 4, 5, and 6 subequal in length but each slightly broader; club acutely pointed, almost as long as the five preceding segments, its first and second segments equal in length. *Prothorax* almost one third broader than long (2.6: 1.9, male holotype, 2.8: 2.0, female allotype), broadest at about the basal third, broadly rounded on the sides to the well marked subapical constriction which shallowly interrupts the longitudinal dorsal outline; coarsely reticulate, coarsely and densely punctate, the interstices between the punctures narrower than the punctures, the punctures bearing anteriorly directed, curved, lanceolate setae or fine hair-like setae, the setae in front of the scutellum broader. *Scutellum* bare, flattened or appearing slightly concave. *Elytra* more than two thirds as broad as long (2.0: 2.8 in female allotype, 1.9: 2.6 in male holotype), less than three times as long as the prothorax (2.8: 2.0 in female allotype), hardly curved on the sides in the basal half, thence broadly rounded to the apex; striae well developed, their punctures close, rather coarse, and each bearing a fine hair or a seta similar to but smaller than those of the intervals, tenth stria terminating above the

metacoxa; intervals convex, mostly narrower than the striae near the base, but broader behind, each bearing a single row of long, slender, decumbent, lanceolate setae. *Legs* with the femora dentate, the tooth on the fore femora smallest, especially in the female, coarsely reticulate, the punctures bearing curved, decumbent, lanceolate setae, the hind pair reaching to the posterior margin of the fourth ventrite in the female, and to about the middle of the fifth in the male; tibiae with recurved setae, all unarmed at the apex of the female, but the mid and hind pairs distinctly mucronate in the male; tarsi with the first segment not as long as 2 plus 3, 2 about two thirds as long and two thirds as broad as 3. *Sternum* with the prosternal canal with low side walls, the antecoxal cavity and the median postcoxal area densely set with plumose squamae, the coxae separated by less than the breadth of the club of the scape of the antenna; mesocoxae separated by slightly less than the breadth of a coxa; metasternum with three large punctures along the posterior margin between the metacoxae and a row along the anterior margin, and with numerous coarse punctures on the pleural areas, the ventral punctures bearing hair-like setae, those on the sides bearing elongate lanceolate setae, the distance between the mid and hind coxa as great as the longitudinal chord of a metacoxa; metepisternum with a single row of setiferous punctures. *Venter* with the fused first and second ventrites broadly and shallowly concave in the male, convex in the female, but with the base and apex of the first segment depressed in the female, with rather large scattered punctures bearing recurved setae; ventrites 3 and 4 each with a row of rather inconspicuous punctures; ventrite 5 at most minutely punctate. Length: 1.6-1.75 mm.; breadth: 0.8-1.0 mm.

Caroline Islands: Holotype male and two paratypes from Dublon Island, Truk Group, December 25, 1935, allotype female and one paratype from Melekeiok, Palao Group, April 7, 1936, collected by Z. Ono.

This species is closely allied to *Amblycnemus dentipes* Zimmerman (in press) from Guam, but *dentifer* is paler in color, it is shorter and broader, the rostrum is comparatively shorter, and the antennal club is almost as long as the preceding five segments, whereas it is only about as long as the four distal funicular segments in *dentipes*.

In addition to the type series there is a mashed specimen from Dublon in the collection that has transverse maculae on the elytra similar to those on *dentipes*, but it appears to be a color variety of *dentifer*.

The Rhynchophorinae Found in Hawaii (Coleoptera: Curculionidae)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of November 18, 1940)

All of the species of Rhynchophorinae (Calandrinae) found in Hawaii have been introduced. Most of them are common, widespread, readily recognized species of importance to agriculture, but a few of the smaller forms are not always easily recognized by students unfamiliar with the group. It is for that reason that this

paper has been prepared, and it is hoped that the report will enable anyone to determine the Rhynchophorinae that have become established in Hawaii.

There are more than 1,000 described species of Rhynchophorinae, and they are found in all of the major geographical regions. However, comparatively few are endemic to the Holarctic region. The Indo-Pacific regions have the greatest development of genera; the Ethiopian region comes next in numbers of genera, with the Neotropical region having about one half as many genera as the Ethiopian.

Palms, grasses, grains and various seeds are the preferred foods of a large number of the species of the subfamily. These habits make many of the species important pests of crops, stored produce and ornamental plants.

LIST OF THE SPECIES FOUND IN HAWAII

1. **Scyphophorus interstitialis** Gyllenhal.
2. **Rhabdocnemis obscura** (Boisduval).
3. **Polytus mellerborgi** (Boheman).
4. **Diocalandra taitensis** (Guérin-Méneville).
5. **Calandra rugicollis** Casey.
6. **Calandra granaria** (Linnaeus).
7. **Calandra linearis** (Herbst).
8. **Calandra oryzae** (Linnaeus).

8a. **Calandra oryzae** variety **zea-mais** Motschulsky.

KEY TO THE GENERA

1. Large species, at least 10 mm. long; apical antennal segment either truncate or wedge-shaped distad.....2
   Small species, always less than 8 mm. long; usually less than 5 mm. long; distal antennal segment rounded at apex, not truncate or wedge-shaped 3

2 (1). Predominantly reddish to reddish brown in color, maculate; terminal antennal segment with the distal pilose part conspicuously wedge-shaped .....**Rhabdocnemis.**
   Entirely coal black in color, never maculate; terminal antennal segment with the distal part conspicuously truncate and the pilose area confined to the broad, shallowly concave apical truncate part .....**Scyphophorus.**

3 (2). Intercoxal process of the prosternum little more than one half as broad as the intercoxal process of the mesosternum; rostrum separated from the head by a deep, abrupt, transverse, conspicuous, dorsal constriction; body entirely coal black....**Polytus.**
   Intercoxal process of the prosternum obviously much more than one half as broad as the intercoxal process of the mesosternum; rostrum and head usually not separated by a transverse dorsal impression, but if an impression is present, then it is shallow and not conspicuously abrupt; body most often with some reddish coloration and usually maculate.....4

4 (3). Third tarsal segment less than twice as broad as the second and not distinctly bilobed, loosely setose beneath; second ventrite shorter than the third and fourth together.....**Calandra.**
Third tarsal segment at least twice as broad as the second and deeply bilobed, densely pilose and spongy beneath; second ventrite as long or longer than the third and fourth together .....**Diocalandra.**

Genus **Scyphophorus** Schoenherr

Scyphophorus Schoenherr: Gen. Spec. Curc. *4*(2): 855, 1838.

This is an American genus containing two species. The one found in Hawaii is:

Scyphophorus interstitialis Gyllenhal: in Schoenherr's Gen. Spec. Curc. *4*(2): 856, 1838.
Scyphophorus acupunctatus Gyllenhal: op cit., p. 857.
Scyphophorus anthracinus Gyllenhal: op. cit., p. 858.
Scyphophorus asperulus Le Conte: Report of Exploration and Survey, Mississippi to Pacific *12*(3): 58, 1857.
Scyphophorus robustior Horn: Proc. Amer. Philos. Soc. 13: 409, 1873.

This synonymy is that given by Csiki in Coleopterorum Catalogus, part 149, 1936. Le Conte in 1876 (Proc. Amer. Philos. Soc. *15*: 331) said "The species of this genus are parasitic on *Yucca,* and seem to me rather opinionative rather than actual." Champion [Biol. Centr. Amer., Coleopt., *4*(7): 152, 1910], gives the same synonymy except that he uses *acupunctatus* in place of *interstitialis* in spite of the fact that *interstitialis* has page priority.

This species, which has been known in Hawaiian literature as *Scyphophorus acupunctatus,* was first found in Honolulu by Muir in 1918. In 1927 [Proc. Haw. Ent. Soc. *6*(3): 403-404] Swezey published a paper "The Sisal Borer in Hawaii" in which he summarized the history of the beetle in Hawaii to that date. It is thought that the species was introduced to Honolulu in ornamental century plants. In Hawaii the species is found only on the island of Oahu where it can at times be found in abundance about Honolulu boring in stems and leaves of sisal, sometimes killing the plants, and it has been found damaging *Agave mexicana,* an ornamental species.

Cotton figures the larvae of this species in Proc. U. S. Nat. Mus., *66*: 8, pl. 8, figs. 1-7, pl. 10, fig. 7, 1924.

Because of its large size (12-15 mm.) and entirely black body, this species is easily recognized.

Genus **Rhabdocnemis** Faust

Rhabdocnemis Faust: Ann. Mus. Civ. Genova, *14*: 348, 1894.

The natural distribution of the eight described species of this genus is from Burma to New Guinea. The species found in Hawaii is the destructive New Guinea sugar cane borer:

Rhabdocnemis obscura (Boisduval).

Calandra obscura Boisduval: in d'Urville's Voyage de l'Astrolabe, Ent. *2*: 448, 1835.
Sphenophorus insularis Boheman: Eugenies Resa, Ins., p. 148, 1859.
Sphenophorus nudicollis Kirsh: Mitt. Mus. Dresden, *2*: 156, 1877.
Sphenophorus promissus Pascoe: Ann. Mus. Genova, *2*: 300, 1885.
Sphenophorus tincturatus Pascoe: op. cit., p. 301.
Sphenophorus beccarii Pascoe: op. cit., p. 301.
Sphenophorus interruptecostatus Schaufuss: Horae Soc. Ent. Ross., *19*: 204, 1885.

Williams in "The Insects and Other Invertebrates of Hawaiian Sugar Cane Fields", pp. 209-218, 1931, gives an excellent, extensive discussion of the beetle, its distribution, habits, life history, destructiveness with illustrations, and thus a detailed account need not be given here.

This insect not only does damage to sugar cane that has been estimated to be as great as $200,000. a year on one plantation, but it has been found in Hawaii in *Pritchardia,* royal, coconut and probably other palms, and occasionally in papaya, banana and corn.

The weevil is thought to have been introduced to Hawaii from the south Pacific about the eighteen fifties, and it was damaging sugar cane in 1865.

Genus **Polytus** Faust

Polytus Faust: Ann. Mus. Civ. Genova, *14*: 353, 1894.

This is a monotypic genus whose genotype is:

Polytus mellerborgi (Boheman).

Calandra mellerborgi Boheman: In Schoenherr's Gen. Curc., *4*: 976, 1838.
Calandra remota Sharp: Trans. Royal Dublin Soc., (2)*3*: 184, pl. 5, fig. 29, 1885.
Polytus mellerborgi (Boheman) Faust: Ann. Mus. Civ. Genova, *14*: 253, 1894.
Sphenophorus musaecola Fairmaire: Ann. Soc. Ent. Belg., *42*: 489, 1898.

Marshall (Bull. Ent. Res. *31*(2): 125, 1940) says that *Calandra mexicana* Champion, 1910, is not a synonym of this species as cited by Csiki in Coleopterorum Catalogus, part 149, p. 71, 1936, but a good species of *Calandra.*

This is a widely spread species found from Madagascar to southeastern Polynesia. It might be called the "lesser banana weevil", and it is often found in numbers in decaying trunks of bananas. Sometimes the larvae, pupae and adults live in an almost aquatic habitat in wet banana tissue. Blackburn (Trans. Royal Dublin Soc. (2)*3*: 183, 1885) records this species from "prickly pear" (*Opuntia*) also, but I have seen no other records of such a host.

This weevil can be easily recognized in the field by its black color and the deep, conspicuous notch between the head and rostrum.

Genus **Diocalandra** Faust

Diocalandra Faust: Ann. Mus. Civ. Genova, *14*: 353, 1894.

This is essentially an Ethiopian and Oriental genus now containing four species. The one found in Hawaii is:

Diocalandra taitensis (Guérin-Méneville).

Calandra taitensis Guérin-Méneville: Iconogr. Règne Animal, p. 171, pl. 39, fig. 4, 1844.

This species has been found from the Solomons to Marquesas islands in the south Pacific, and it probably occurs farther west. Herms (Philippine Journ. Sci., *30*(2): 243-274, 1926, illustrated) gives an account of the beetle, its larva and its work on coconuts in Fanning Island. Doane (Journ. Econ. Ent., *2*(3): 220-223, 1909) discusses the species as he found it in Tahiti. Swezey (Proc. Haw. Ent. Soc. *4*(2): 333, 1920) discusses the species in Hawaii in a paper entitled "The Tahiti Coconut Weevil, Calandra taitensis Guérin, in Hawaii".

The weevil was first found in the Hawaiian islands by Timberlake in 1919 at Honaunau, Hawaii. There are specimens in Bishop Museum from Oahu, Maui and Hawaii.

This weevil feeds in the living or injured tissue of the fronds, flower stalks and wounds of the coconut. Its presence can usually be detected by an amber colored exudation along the margins of the bases of the fronds or other places where the larvae are feeding. The species does not appear to be of economic importance in Hawaii.

Genus **Calandra** of authors

According to Sir Guy Marshall (Bull. Ent. Res., *31*(2): 125, 1940) application has been made to the International Commission of Zoological Nomenclature to establish the long used name of *Calandra* in place of *Sitophilus* Schoenherr, 1838, and until this application is accepted or rejected, it is best to use *Calandra* in place of *Sitophilus*.

This is the genus of grain weevils. There are 20 or more described species, and representatives are found in all of the major geographical regions, with the greatest development being in the Oriental region. Four of the species have become widely spread by commerce.

Essig, 1929, says "The weevils can be killed in infested grain by heating for 6 hours at 120-130° F., or by fumigating with 4 to 6 pounds of carbon disulfide per 1,000 feet of space, or with hydrocyanic acid gas."

The species found in Hawaii may be separated as follows:

Key to the Species of Calandra found in Hawaii

1. Pronotum with conspicuous, sinuous, longitudinal carinulae, without round or ovate punctures, and with a distinct, narrow median carina.....**rugicollis** Casey.
   Pronotum obviously punctate, without carinae.....2
2 (1). Metasternal episterna with only a single row of punctures; pronotum with conspicuously elongate punctures; elytral intervals obviously wider than the narrow intervals, and, except the first, convex and impunctate.....**granaria** (Linnaeus)
   Metasternal episterna with at least two rows of punctures; pronotum with rounded punctures; elytral intervals punctate and narrower than the broad, coarsely punctate striae.....3
3 (2). The subbasal expansion of the rostrum poorly developed, not subbulbose; the downward part of the scrobe contiguous with the fore margin of the eye; pronotal punctures shallow and separated, the surface appearing smooth and shiny....**linearis** Herbst.
   The subbasal expansion of the rostrum well developed, subbulbose; the downward part of the scrobe separated from the eye, the narrow area between the fore margin of the eye and the scrobe punctate; pronotal punctures coarse, deep and close, tending to be longitudinally subconfluent on the sides and cephalad 4
4 (3). Length, excluding the head and rostrum, less than 3 mm.....
   .....**oryzae oryzae** (Linnaeus)
   Length, excluding the head and rostrum, more than 3 mm.....
   .....**oryzae zea-mais** (Motschulsky).

Calandra rugicollis Casey: Ann. New York Acad. Sci. *6*: 686, 1892.

Calandra rugosicollis Hustache: Ann. Soc. Ent. France, *89*: 192, 1921.

Calandra shoreae Marshall: Bull. Ent. Research, *11*: 276, pl. 7, fig. 4, 1924.

Casey described this species from a unique female found in Florida. Hustache redescribed the species from Mauritius and Marshall redescribed it from India where it is known to breed in *Shorea robusta* and *Dipterocarpus turbinatus*. Swezey [Proc. Haw. Ent. Soc. *7*(2): 279, 1929] recorded the species in Hawaii for the first time from a specimen collected in Honolulu in 1928. There is a unique specimen in Bishop Museum collected in Honolulu in 1930 by Bryan. There are four specimens in the Hawaiian Sugar Planters' Experiment Station collection from Honolulu, but none were bred. Nothing is known to me of the habits of this species in Hawaii.

Calandra granaria (Linnaeus).

Curculio granarius Linnaeus: Syst. Nat. 10th edition, p. 378, 1758.

Curculio segetis Linnaeus: Syst. Nat. 10th edition, p. 381, 1758.

Curculio pulicarius Panzer: In Voet's Beschr. Ins., *4*: 54, pl. 37, fig. 17, 1798.

Sitophilus unicolor Marshall: Ent. Brit. *1*: 275, 1802.

Sitophilus granarius (Linnaeus) Gyllenhal, in Schoenherr's Gen. Spec. Curc., *4*: 977, 1837.

Sitophilus remotepunctatus Gyllenhal: In Schoenherr's Gen. Spec. Curc., *4*(*2*): 979, 1838.

This species is almost cosmopolitan and is known as the "granary weevil". Csiki, in Coleopterorum Catalogus, part 149, 1936, gives two pages of bibliography on this species.

This species has atrophied wings and cannot fly. It is said to complete a life cycle in about six weeks. It may attack many stored cereals and cereal products. I have no record of its first capture in Hawaii.

Cotton, Proc. U. S. Nat. Mus. *66*: 6, 1924, gives illustrations of the larva in plate 3, figs. 1-7 and plate 10, fig. 1.

Calandra linearis (Herbst)

Rhychophorus linearis Herbst: Natursyst. Ins., Käffer, *7*: 5, pl. 100, fig. 1, 1795.
Cordyle striatus Thunberg: In Nova Acta Upsala, *7*: 112, 1815.
Calandra tamarindi Christy: Trans. Ent. Soc. London, *1*: 36, 1834.
Sitophilus linearis (Herbst) Gyllenhal, in Schoenherr's Gen. Spec. Curc., *4*: 979, 1837.

This is probably an Oriental species which has been distributed to Africa, South and North America. It is abundant in the seeds of tamarind throughout the Hawaiian islands where tamarind is grown. It is called the tamarind weevil. I do not know when the species first became established in Hawaii, but it was found widely distributed by Blackburn in the "eighties".

Calandra oryzae (Linnaeus).

Curculio oryzae Linnaeus: Amoen. Acad. *6*: 395, 1763.
Curculio frugilegus De Geer: Mem. Ins., *5*: 273, 1781.
Curculio granarius Stroem (not Linnaeus): Danske Vid. Selsk. Skrift., *2*: 56, 1783.
Sitophilus oryzae (Linnaeus) Gyllenhal, in Schoenherr's Gen. Spec. Curc., *4*: 981, 1837.
Cossonus quadrimaculatus Walker: Ann. Mag. Nat. His. (3)*4*: 219, 1859.
Sphenophorus quadriguttatus Montrouzier: Ann. Soc. Ent. France, (3)*8*: 910, 1860.

This Oriental species has become cosmopolitan and is known as the rice weevil. It attacks a great variety of stored grains, cereals and food products. It is common in populated areas throughout the islands.

Calandra oryzae variety **zea-mais** Motschulsky.

Calandra zea-mais Motschulsky: Etud. Ent., *4*: 77, 1855.

This variety is always much larger and stouter than the typical form. It is occasionally found in abundance in corn in Hawaii.

The Bostrichidae Found in Hawaii (Coleoptera)

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of November 18, 1939)

There are no endemic bostrichids in the Hawaiian islands. Seven species have been introduced and apparently established, and one (*Polycaon stouti*) is occasionally bred from furniture or lumber imported from western North America. There have been no local keys written to aid in the identification of the species found in Hawaii, and it is principally for that reason that this paper is presented to the Society.

The classification and synonymy followed here is principally that of Lesne in his revisional papers (Ann. Soc. Ent. France, 1896-1909) and in Coleopterorum Catalogus, part 161, 1938.

I owe my sincere thanks to Messrs. C. F. W. Muesebeck, W. S. Fisher and J. F. G. Clarke, of the United States Bureau of Entomology and Plant Quarantine, for their aid in supplying data on synonymy. Because of inadequate library facilities in Hawaii, the manuscript was sent to Mr. Muesebeck and under his direction Messrs. Fisher and Clarke supplied some notes from literature in libraries at Washington and Mr. Clarke completed the work at the American Museum of Natural History and the Philadelphia Academy of Science. Without such cooperation, this report could not have been presented in its present form.

LIST OF THE SPECIES

1. **Polycaon stouti** (Le Conte).
2. **Dinoderus minutus** (Fabricius).
3. **Rhyzopertha dominica** (Fabricius).
4. **Sinoxylon conigerum** Gerstaecker.
5. **Amphicerus cornutus** (Pallas).
6. **Xylothrips religiosus** (Boisduval).
7. **Xylopsocus capucinus** (Fabricius).
8. **Xylopsocus castanoptera** (Fairmaire).

KEY TO THE SUBFAMILIES

1. Head not hidden from above by the prothorax, but obviously exposed; pronotum not denticulate in front.....**Polycaoninae.**
   Head, in normal position, concealed from above by the prothorax which is armed with denticles in front..... 2
2(1). Pronotum with the fore edge convex, not truncate nor conspicuously emarginate; tarsi shorter than the tibiae.....**Dinoderinae.**
   Pronotum with the fore edge either truncate, concave or conspicuously emarginate; tarsi as long or distinctly longer than the tibiae .....**Bostrichinae.**

POLYCAONINAE

Genus **Polycaon** Castelnau

Polycaon Castelnau: in Silberman's Revue Ent., *4*: 30, 1836.
Exops Curtis: Trans. Linn. Soc. London, *18*(*2*): 204, 1839.
Allaeocnemis Le Conte: Proc. Phil. Acad. Sci., *6*: 233, 1853.

1. Polycaon stouti (Le Conte).
Allaeocnemis stouti Le Conte: Proc. Phil. Acad. Sci., *6*: 233, 1853.
Polycaon ovicollis Le Conte: Report of Exploration and Survey, Mississippi to Pacific, *12*(3): 49, 1857.

The first record of this species in Hawaii is that by Swezey [Proc. Haw. Ent. Soc., *5*(*2*): 192, 1923] who recorded the emergence of two specimens of the beetle from an oak table in Honolulu in 1922. In 1932 Van Zwaluwenburg recorded the emergence of a specimen from a piece of furniture in Maui in August, 1931. The furniture had been brought from the Pacific Coast in November 1929. In 1934 Pemberton recorded that a second specimen had issued from the same piece of furniture in 1933. There are several specimens in the Hawaiian Sugar Planters' Association Experiment Station collection which emerged from walnut and maple furniture several years after importation to Hawaii from the west coast of North America.

This species is all black and varies from 17 to 20 mm. or more in length. Its range includes Arizona, California and Oregon. It has not been known to reproduce in Hawaii.

DINODERINAE

KEY TO THE GENERA FOUND IN HAWAII

Ventrite 5 with the hind margin entire, subtruncate or slightly convex but not concave.....**Dinoderus.**
Ventrite 5 with the hind margin conspicuously concave.....**Rhyzopertha.**

Genus **Dinoderus** Stephens

Dinoderus Stephens: Illustrations British Ent., Mandibulata, *3*: 352, 1830.
Patea Casey: Journ. New York Ent. Soc., *6*: 66, 1898.

2. Dinoderus minutus (Fabricius).
Apate minutus Fabricius: Syst. Ent., p. 54, 1775.
Dinoderus substriatus Stephens (not Paykull): Illustrations British Ent., Mandibulata, *3*: 352, 1830.
Bostrichus vertens Walker: Ann. Mag. Nat. Hist. *3*: 260, 1859.
Rhizopertha sicula Baudi: Berlin. Ent. Zeitschr., *17*: 336, 1873.

Most of the species of the genus have been described from Indonesia. Perkins (Fauna Haw., *3*: 643, 1910) recorded this species from bamboo furniture from Oahu, and I have seen specimens reared from bamboo furniture in Honolulu only. The species has become cosmopolitan.

Genus **Rhizopertha** Stephens

Rhizopertha Stephens: Illustrations British Ent., Mandibulata, *3*: 354, 1830.

3. Rhizopertha dominica (Fabricius), Stephens, loc. cit.

Synodendron dominicum Fabricius: Ent. Syst., *1*(*2*): 359, 1792.
Synodendron pusillum Fabricius: Ent. Syst., Suppl. V, p. 156, 1798.
Ptinus fissicornis Marsham: Ent. Brit., *1*: 82, 1802.
Ptinus piceus Marsham: op. cit., p. 88.
Apate rufa Hope: Trans. Ent. Soc. London, *4*: 17, 1845.
Apate frumentaria Nördlinger, Klein. Feinde der Landw., p. 189, fig., 1855.
Bostrichus moderata Walker: Ann. Mag. Nat. His., (III)*3*: 260, 1859.
Bostrichus exiguus Walker: loc. cit.

This species was collected by Blackburn, and Perkins (Fauna Haw. *3*: 643, 1910) listed it from "Oahu, Hawaii and no doubt other islands." In Bishop Museum there are six specimens collected in Honolulu in 1928 but no host data are given. There is a series of specimens in the collection of the Hawaiian Sugar Planters' Association Experiment Station reared from corn in Honolulu. A large series in the University of Hawaii collection was reared from dog biscuits.

Chittenden (U. S. Dep't Agric. Bureau of Ent. Bull. 96, part 3, 1911) calls this species the "lesser grain-borer" and gives an extensive discussion of the species including its life history, damage done, and an illustration.

BOSTRICHINAE

KEY TO THE GENERA FOUND IN HAWAII

1. Mandibles not decussate, but meeting nearly on a straight line; the three distal antennal segments greatly elongated transversely and forming a pectinate club in the Hawaiian species ..... **Sinoxylon.**

   Mandibles decussate; the three distal antennal segments not pectinate 2

2(1). Intercoxal process of the first ventrite fully as broad or broader than the breadth of a fifth tarsal segment and obviously separating the metacoxae; each segment of the club of the antennae with two longitudinal grooves on their broadest sides..... ..... **Amphicerus.**

   Intercoxal process of the first ventrite a thin lamella obviously much narrower than a fifth tarsal segment, the metacoxae subcontiguous; segments of the antennal clubs without longitudinal grooves 3

3(2). Front of head with conspicuous, long, erect hair which is particularly dense near the anterior margin of the front on either side of the median line; the anterior margin of the front of the first two segments of the antennal club distinctly longer than broad..... ..... **Xylothripa.**

   Front of head without dense, conspicuous hair; first two segments of the antennal club broader than long..... **Xylopsocus.**

Genus **Sinoxylon** Duftschmidt

Sinoxylon Duftschmidt: Fauna Austr., *3*: 85, 1825.
Trypocladus Guérin-Méneville: Ann. Soc. Ent. France, p. 17, 1845.
Apatodes Blackburn: Proc. Linn. Soc. New South Wales, (II) *3*: 1429, 1889.

4. Sinoxylon conigerum Gerstaecker: Monatsb. Berlin Akad., p. 268, 1855.

Sinodendron unidentatum Fabricius: Syst. El., *2*: 377, 1801.

I have records of this species having been bred from *Hibiscus rosa-sinensis, Ceiba, Gossypium tomentosum,* algaroba, avocado and pigeon peas in the islands. It does some damage to the lead sheathing around telephone cables throughout the islands by boring neat holes through the sheathing thereby permitting the entrance of water which causes short circuits. Swezey [Proc. Haw. Ent. Soc. *4*(*2*): 247, 1920] reported that the adults bored into branches of a fallen algaroba an inch to an inch and a half in diameter nearly severing them so that they were easily broken off. The species was common in Perkins' time, but I have no record of its first capture in Hawaii.

This insect is widespread and has been found from Africa to the Pacific and also in South America.

Genus **Amphicerus** Le Conte

Amphicerus Le Conte: Class. Coleopt. North Amer., p. 208, 1861.
Caenophrada Waterhouse: Ann. Mag. Nat. Hist. (VI) *1*: 350, 1888.
Schistoceros Lesne: Ann. Soc. Ent. France, *67*: 442, 1899, (now considered a subgenus).

The members of *Amphicerus,* sens. str., are in America.

5. Amphicerus cornutus (Pallas).
Ligniperda cornutus Pallas: Spic. Zool. fasc. 9, p. 8, pl. 1, fig. 4, 1772.
Bostrichus bicornutus Latreille: Voy. Humboldt, *2*: 65, pl. 4, fig. 6, 1833.
Bostrichus peregrinus Erichson: Arch. für Naturg. *13*: 87, 1847.
Apate punctipennis Le Conte: Proc. Phil. Acad. Sci., p. 73, 1858.
Bostrichus migrator Sharp: Trans. Royal Dublin Soc., (II) *3*: 160, 1885.

This tropical American species was collected by Blackburn and erroneously redescribed from Hawaii as new by Sharp in 1885. It is a common species of the Hawaiian lowlands. I have records of its being bred from *Hibiscus rosa-sinensis, Hibiscus cameronii,* algaroba, *Euphorbia, Scaevola koenigii,* bamboo, dry sugar cane, *Bougainvillea, Indigofera,* and *Gossypium tomentosum.* Bridwell [Proc. Haw. Ent. Soc. *4*(*2*): 328, 1920] says "The eggs are deposited in the bottom of the burrow; the larvae continue to burrow further down; in this way the insect serves as a twig pruner." The species is frequently attracted to lights. Although it is probably more widely spread, I have seen Hawaiian specimens collected from Oahu, Molokai and Maui only.

Genus **Xylothrips** Lesne

Xylothrips Lesne: Ann. Soc. Ent. France, *69*: 620, 1901.

This genus contains three species, probably all Indo-Malayan in origin. The following species has not yet been reported from outside of Oceania.

6. Xylothrips religiosus (Boisduval).

Apate religiosus Boisduval: Voyage de l'Astrolabe, *2*: 460, 1835.
Apate religiosæ Fairmaire: Rev. Mag. Zool., (II) *2*: 50, 1850.
Apate destructor Montrouzier: Ann. Soc. Agric. Lyon, (II) *7*: 55, 1855.
Apate liguana Montrouzier: Ann. Soc. Ent. France, (IV) *1*: 267, 1861.

Blackburn collected this species. Perkins said that it was "very abundant," but few samples are in local collections. I have seen specimens bred from dead *Hibiscus tiliaceus* and avocado, and from Kauai, Oahu and Hawaii.

Genus **Xylopsocus** Lesne

Xylopsocus Lesne: Ann. Soc. Ent. France, *69*: 627, 1901.

Most of the 13 species of this genus are Indo-Pacific in origin.

KEY TO THE SPECIES OF XYLOPSOCUS FOUND IN HAWAII

Antennae 9-segmented; lateral margin of elytral declivity carinately elevated nearly to or to the suture; elytra, in front of the declivity, deeply and densely punctate, the derm appearing asperate..... .....**X. capucinus** (Fabricius).

Antennae 10-segmented; lateral margin of elytral declivity without a carina extending upward to or near the suture; elytra only shallowly punctate in front of the declivity....**X. castanoptera** (Fairmaire).

7. Xylopsocus capucinus (Fabricius).

Apate capucinus Fabricius: Spec. Ins. *1*: 62, 1781.
Bostrichus eremita Olivier: Enc. Meth. Ins., *5*: 110, pl. 2, fig. 11, 1795.
Apate marginatus Fabricius: Syst. El., *2*: 382, 1801.
Enneadesmus nicobaricus Redtenbacher: Reise der Novara, 2(1): 114, 1868.

This species is recorded from a single example collected by M. B. Linford, March 12, 1939 on Lanai. The specimen bears the label "Pineapple fields, flight," but Sakimura and Linford [Proc. Haw. Ent. Soc. *10*(3): 452, 1940] record the capture as "resting in automobile." It may be that the species is established in the Hawaiian islands, and I have, therefore, included it here.

8. Xylopsocus castanoptera (Fairmaire).

Apate castanoptera Fairmaire: Rev. Mag. Zool. (II) *2*: 50, 1850.
Apate affinis Brancsik: Jahresheft Naturwiss. Ver. Trencsin. Comt., *15*: 235, 1893.

This species was collected by Blackburn in Hawaii and is now a common species. I have records of its being bred from the stems

of pigeon peas, *Gossypium tomentosum*, avocado, dead cotton, algaroba, dead sugar cane, and *Leucaena glauca*.

In addition to these species, there are four specimens of *Heterobostrichus aequalis* (Waterhouse) in Bishop Museum which were taken by J. C. Bridwell from the wood of a packing case imported from Manila to Honolulu, November 1, 1919. I have not included this species in the keys because this is the only record of its interception that has come to my attention.

Argentine Ant in Hawaii

BY ELWOOD C. ZIMMERMAN
Bernice P. Bishop Museum

(Presented at the meeting of October 14, 1940)

The Argentine ant, *Iridomyrmex humilis* Mayr, has been discovered in the islands for the first time well established at Fort Shafter in Honolulu. Residents of the area stated that the ants had caused considerable trouble in their houses since late spring or early summer, thus indicating that the ant had become well established several months ago. A preliminary survey of the area showed that the ants were very abundant and widespread at Fort Shafter with numerous strongly developed colonies established. Where the Argentine ants were numerous, other ants, particularly *Pheidole megacephala* (Fabricius), were scarce or not found. The shallow nests were common in the soil around the bases of trees, under trash and in debris in holes and cavities in trees. No other ants were found on trees, shrubs or at flower blossoms on which the Argentine ant foraged.

The Argentine ant is commonly intercepted at quarantine in goods coming from California, and it appears unusual that the species has not hitherto become established in Hawaii.

The development and spread of this ant in Hawaii will present some interesting biological, ecological and economical problems. In those regions where it is established on the continent it is a serious pest in house, garden and field. Not only does the ant cause considerable annoyance and eat sweet foods and meats wherever available, but it tends such honeydew producing insects as aphids, mealybugs and scale insects. The ants not only carry honeydew producing insects from plant to plant, but they also reduce the efficiency of parasites of honeydew producing insects. Wheeler (Revised List of Hawaiian Ants, Bishop Museum Occasional Papers, *10*(21):8, 1934) writing of the Argentine ant said: "Should it eventually secure a foothold in the islands, we may look forward to a repetition of what has occurred in Madeira and the Canary Islands, where it has not only exterminated *Pheidole megacephala*, but has also practically wiped out the indigenous ant fauna at elevations below 3,000 feet, . . ."

77th Contribution to the Morphology and Taxonomy of the Scolytoidea.

BY DR. KARL E. SCHEDL
Hann. Münden, Deutsches Reich

In the spring of 1939 I received a rather large collection of Scolytidae and Platypodidae by the courtesy of the Imperial Institute of Entomology of London which were mainly collected by O. H. Swezey, Consulting Entomologist of the Hawaiian Sugar Planters' Association, on the various islands of Hawaii. The material contains, besides several new species, most of the other species hitherto recorded from that region. Although it has been quite difficult to interpret some of the species without examination of the unique types in the British Museum, I think it will be more satisfactory to publish this preliminary account so that investigators interested in the biology of these species should find some grounds to work on.

For the comparison of some of the species I have to give my appreciation to E. B. Britton of the British Museum; others have been compared before communication of the collection to me by G. E. Bryant of the Imperial Institute of Entomology. Types of the following new species are deposited in the collection of the Hawaiian Entomological Society and in my own. Where no collector is mentioned, all specimens were collected by O. H. Swezey.

1. Hypothenemus insularis Perk.

Being not certain about the identity of this species, I have given a description (Stylops, 3, 1928: 178) of what I meant it should be. Specimens compared with the type by G. E. Bryant verified my determination.

Oahu: Manoa, 24-XI-1927, ex pea vine
Oahu: Manoa, 9-XI-1927, ex *Calotropis procera*
Oahu: Manoa, 25-II-1927, ex pigeon-pea (*Cajanus cajan*)
Oahu: Manoa, 30-XII-1928, ex *Calotropis procera*
Oahu: Manoa, 28-IX-1927, ex yellow *Ipomoea* (*Ipomoea tuberosa*)
Oahu: Waipio, 25-III-1920, ex pigeon-pea wood (*Cajanus cajan*)
Oahu: Waipio, 15-X-1924, under bark of monkeypod (*Samanea saman*)
Oahu: Kolekole Pass, 23-X-1927, ex *Bidens waianensis*
Oahu: Kaimuki, 14-I-1923, ex banyan
Oahu: Punaluu, 12-XII-1926, ex hau (*Hibiscus tiliaceus*)
Maui: Wailuku, 1-XI-1927, ex croton
Kauai: Lihue, 25-IV-1928 (Duvel), under bark of dead breadfruit

Oahu: Ft. Kamehameha, 8-V-1927, on *Batis maritima,* (F. X. Williams)
Oahu: Honolulu, 11-III-1923, ex orange twig
Oahu: Honolulu, 24-XI-1927, ex croton.

2. Hypothenemus ruficeps Perk.

I have just seen specimens which have been compared by E. G. Bryant. They are but little larger than *H. insularis* Perk., somewhat more slender, and the asperities of the frontal margin of the pronotum are subequal in size, while those of *H. insularis* gradually increase in size towards the middle.
Maui: Mahena, 12-X-1926, ex *Acacia koa,* and 13-X-1926, ex *Cibotium menziesii.*

3. Hypothenemus eruditus Westw.

Three specimens determined as *H. eruditus* by Perkins, I am unable to separate from *H. insularis* Perk.

4. Hypothenemus oahuensis n. sp.

Yellowish brown, 1.2-1.4 mm. long, 2.5 times as long as wide. The size and general appearance are rather similar to those of *H. areace* Horn, the sculpture and vestiture are quite different.

Front slightly transversely depressed below, a transverse carina above, densely and coarsely punctured, the median line impunctate and shining below.

Pronotum as long as wide, widest at the base, sides feebly narrowed in a shallow curve, apex broadly rounded, frontal margin with six asperities, of which the median two are larger and more closely placed; summit at the middle, strongly convex in front, with a shallow transverse impression behind, covered by rather small asperities on a narrow area, but leaving a wide space between the frontal margin and the first row, interspaces and basal area granulate-punctate, with short erect hairs. Scutellum small, triangular.

Elytra as wide and 1.5 times as long as the pronotum, base finely margined, sides parallel beyond the middle, apex moderately broadly rounded, declivity short, evenly convex; disc of a silky appearance, with rows of shallow punctures, interstices moderately wide, densely reticulately wrinkled, with rows of minute punctures, which bear small erect scales, these large on the declivity, with numerous reddish hairs of about the same length on each side of the scales.

Locality: Oahu: Punaluu, 12-XII-1926, ex hau (*Hibiscus tiliaceus*); Waipio, 25-III-1920, ex stem of pigeon pea.

5. Hypothenemus mauiensis n. sp.

Piceous, 1.3 mm. long, 2.4 times as long as wide. The specimens look like a large *H. oahuensis,* but are exceedingly coarsely sculptured.

Front uniformly convex, densely granulate-punctate, with indications of a median carina.

Pronotum but little wider than long, sides subparallel on the basal fourth, apex rather broadly rounded, the asperities of the frontal margin just as in *H. oahuensis,* interspaces and basal area granulate-punctate, with short erect hairs, especially on the sides. Scutellum small, triangular.

Elytra with the outline and shape of the declivity similar as in the foregoing species, but the disc with rows of very coarse punctures, the inter-

spaces narrower, more shining, without the dense reticulation, the strial punctures becoming larger and deeper on the declivity, the interspaces consequently narrower, the scales of the same shape, but on account of the shining interspaces and the darker color more conspicuous, without accompanying hairs.

Locality: Maui: Iao Valley, 8-VII-1920, ex *Euphorbia.*

6. Ericryphalus sylvicola (Perk.)

Specimens determined by G. E. Bryant on hand of material in the British Museum and my own careful examination of the antennae leave no doubt, that this species has to be placed in the genus *Ericryphalus* Hopk. The comparison with the description of *Ericryphalus henshawi* Hopk. although opens the question whether or not both species are the same.

Oahu: Waipio, 25-III-1920, ex pigeon-pea wood.
Oahu: Kaimuki, 14-I-1923, ex banyan.
Oahu: Manoa, 4-I-1920, ex *Clermontia* (Bridwell).

7. Ptilopodius pacificus n. sp.

The description of *Hypothenemus sylvicola* Perk. given by the author in Stylops, 3, 1934, p. 179, refers to a new species of the genus *Ptilopodius,* for which the name *pacificus* is proposed. A single specimen from Oahu: Waimano, 22-XI-1931, ex hau (*Hibiscus tiliaceus*) can be referred to this new *Ptilopodius.*

8. Stephanoderes (Hypothenemus) maculicollis (Sharp).

Comparing the numerous specimens with *Stephanoderes alter* Egg., I can see only minor differences and it will probably become necessary to unite both species under one name. At the present the somewhat smaller Hawaiian specimens are kept separately.

Oahu: Kaimuki, 10-II-1923, ex dead *Indigofera anil*
Oahu: Kaimuki, 2-III-1922, ex dead *Crotalaria saltiana*
Oahu: Kaimuki, 14-VI-1921, ex *Clitoria ternatea*
Oahu: Waipio, 25-III-1920, ex stem of dead pigeon-pea.

9. Stephanoderes lebronneci Bees.

One specimen from Guam and several others from the Hawaiian Islands perfectly agree with the description of *Stephanoderes lebronneci* Bees., except that they are somewhat larger (1.5-1.6 mm.)

Guam: Piti, 5-I-1936, (O. H. Swezey)
Oahu: Manoa, 25-I-1927, ex pigeon-pea
Oahu: Kolekole Pass, 23-X-1927, ex *Bidens waianensis*
Oahu: Honolulu, 18-VI-1924, ex dead cane
Oahu: Koko Head, 22-III-1927, ex *Panicum torridum*
Oahu: Kaimuki, 10-II-1923, ex dead *Indigofera anil*

10. Stephanoderes hawaiiensis n. sp.

Yellowish brown, 1.3 mm. long, 2.1 times as long as wide. A very stout and coarsely sculptured species.

Front transversely depressed and shining below, with a transverse carina above, remotely punctured.

Pronotum wider than long (31 : 28), widest at the base, sides and apex conjointly rounded, frontal margin with six subequal small asperities; summit in the middle, anterior area rather steeply convex, finely asperate on a narrow area, interspaces and the broad basal area densely and rugosely punctured, pubescence short. Scutellum small, triangular.

Elytra but little wider and 1.4 times as long as the pronotum, sides parallel on more than the basal half, apex somewhat angulately rounded, declivity commencing at the middle, obliquely convex; disc coarsely punctured in rows, the first row distinctly striate, interstices narrow, each with a row of very small punctures, those bearing pale, erect scales, more strongly developed on the declivity.

Locality: Oahu: Honolulu, 18-VI-1924, ex dead cane.

11. Poecilips (Thamnurgides) persicae (Hopk.).

A good series, undoubtedly of Hopkins' species before me, agrees in all respects with the generic characters of *Poecilips* Schauf., in fact, the two species, *Thamnurgides persicae* Hopk. and *Poecilips sannio* Schauf. are so extremely alike, that it is doubtful if Hopkins' species can hold good in the future.

Oahu: Mt. Tantalus, 28-XI-1926, ex *Pipturus albidus*

12. Xyleborus fornicatus Eichh.

Oahu: Kaimuki, 17-VII-1921, ex dead avocado (*Persea gratissima*)
Oahu: Waipio, 25-III-1920, ex dead pepper tree (*Schinus molle*)
Oahu: Honolulu, 24-IX-1927, ex *Sterculia foetida*
Oahu: Manoa, 2-IX-1930, ex *Nothopanax guilfoylei,* (E. M. Ehrhorn)
Oahu: Manoa, 4-XII-1926, ex kukui (*Aleurites moluccana*)
Hawaii: Kohala, VIII-1924, ex tamarind, (Mrs. Bond)
Maui: Puunene, 16-VIII-1930, ex avocado (*Persea gratissima*)
Oahu: Kualoa, 12-XII-1924, ex *Albizzia lebbek,* (McEldowney)

13. Xyleborus spinosulus Schedl.

Oahu: Tantalus, 5-V-1918, ex monkeypod (*Samanea saman*)

14. Xyleborus hawaiiensis Perk.

Oahu: Makaleha Val., 13-XII-1919, ex *Pipturus albidus*
Oahu: Hauula Val., 17-V-1925, ex *Pipturus albidus*

15. Xyleborus truncatus Sharp.

This species shows variations in size not very common among the Scolytidae. The description states 2.5 mm. long, a cotype at the British Museum measures 2.73 mm., and the length of the specimens represented in this collection are given in the locality table (in brackets the number of specimens, then the range of variation, and again in brackets the mean length). Aside from

the length itself, and the proportional coarseness of the sculpture, there are no differences of taxonomic value. As all specimens before me, as well as the types, and other specimens I have seen before, originate from Oahu, the differences in size may be due to the altitude of the collecting place and perhaps the type of food-plant.

Oahu: Manoa, 28-IV-1918, ex koa (*Acacia koa*) ..... (3), 2.47-2.50 mm. (2.48 mm.)
Oahu: Manoa, 26-XII-1927, ex *Acacia koa* ..... (3), 2.39-2.50 mm. (2.46 mm.)
Oahu: Manoa, XI-1919, ex *Syzygium sandwicensis*, (J. C. Bridwell) ..... (4), 2.59-2.76 mm. (2.64 mm)
Oahu: Manoa, 4-I-1920, ex *Straussia*, (J. C. Bridwell) ..... (8), 3.07-3.13 mm. (3.08 mm.)
Oahu: Kahauiki, 28-IX-1924, ex *Acacia koa* ..... (1), (2.50 mm.)
Oahu: Tantalus, 4-VII-1930, ex *Acacia koa* ..... (1), (2.59 mm.)
Oahu: Palolo, 11-XII-1921, ex *Syzygium sandwicensis* (Ohia ha) ..... (5), 2.56-2.68 mm. (2.65 mm.)
Oahu: Cooke Trail, 5-IV-1919, ex *Perrottetia sandwicensis* ..... (4), 2.73-2.85 mm. (2.79 mm.)

16. Xyleborus oahuensis Perk. var **scabratus** n. var.

Specimens fitting the description were kindly compared with the type by E. B. Britton and found "having the sculptured lines (asperities) on the thorax more numerous, closer and extending slightly farther towards the base."

Considering the wide variations in *Xyleborus truncatus* Sharp, I hesitate to describe a new species, but shall regard it as a variety, *oahuensis* var. *scabratus*. Aside from the specimens mentioned below, I have seen a specimen from Honolulu, T. H. The length of the females varies from 3.64 to 3.87 mm.

FIG. 1. *Xyleborus oahuensis* var. *scabratus*, outline of the male.

Description of the male. Yellowish brown, 3.4 mm. long, not quite three times as long as wide.

Head entirely concealed by the pronotum, front plano-convex, depressed below, and along the median line above, so that at the commencement of the vertex two flat elevations appear, surface shining, punctuation not very distinct, eyes very small.

Pronotum with the outline as in fig. 1, excavate in front, cavity shining, polished in front, rugosely punctured behind, the punctures becoming remotely placed on the disc, and distinctly larger towards the base and the median line. Scutellum very small.

Elytra cylindrical on little more than the basal half, obliquely truncate behind, but the margins not acute; disc striate-punctate, the punctures rather small and closely placed, the interstices transversely wrinkled, more so on the sides, and with scattered punctures; declivital face nearly flat, a very shallow depression on both sides of the suture in the middle, strongly rugosely wrinkled, the strial punctures subobsolete, with two tubercles on the second and a few very small ones on the third interstices, the suture narrow, feebly elevated, impunctate; pubescence rather long on the pronotum and the elytra declivity.

Locality: Oahu: Pupukea, 26-IV-1925, ex *Xylosma hawaiiense* (3 ♂♂, 5 ♀♀).
Oahu: Honolulu (1 ♀).

17. Xyleborus tantalus n. sp.

Female.—Dark reddish brown, 3.4 mm. long, 3.0 times as long as wide. Of the same general appearance as *X. obliquus* Sharp (cotype at the British Museum), but very much smaller (4.0: 3.4 mm.) and with other proportions.

Front feebly convex, minutely punctulate, medially broadly and feebly elevated, laterally with irregularly placed punctures.

Pronotum longer than wide (25: 20), postero-lateral angles strongly rounded, sides parallel on more than the basal half, then rather abruptly broadly rounded; summit at the middle, anterior area obliquely declivous, densely and finely asperate, basal area shining, with scattered minute punctures. *X. obliquus* Sharp has the pronotum as long as wide, the apical margin more narrowly rounded, and the summit appearing higher.

Elytra as wide and 1.4 times as long as the pronotum (*X. obliquus* nearly twice as long as the pronotum), shining, sides parallel on the basal two thirds, rather narrowly rounded at the apex, the declivity commencing far beyond the middle, very oblique, with a similar depression as in *X. obliquus* Sharp; disc with regular rows of rather large and deep punctures, the sutural space strongly widened from the base to the commencement of the declivity, with a few punctures, the other interspaces regular, with scattered transverse wrinkles and punctures; declivity with the suture wide, with a fine granule at the commencement of the convexity, first and second striae rather deep, the punctures large, the second interstice with a row of very fine punctures, the third distinctly elevated, with several small granules, more of these fine tubercles on the sides.

Locality: Oahu: Tantalus, ex *Byronia sandwicensis,* (J. C. Bridwell).

18. Xyleborus nuuanus n. sp.

Female.—Yellowish brown, 2.6 mm. long, 2.76 times as long as wide. Another species of the difficult group of *X. mascarensis* Eichh., *X. torquatus* Eichh., *X. fuscobrunneus* Eichh., etc.

Front feebly convex, subshining, minutely punctate, coarsely punctate.

Pronotum longer than wide (55: 47), of the same general outline as *X. mascarensis* but little more slender, the apex more narrowly rounded, summit high, at the middle, anterior area finely and densely asperate, basal area with the median line shining, with shallow but coarse and irregularly placed

punctures, giving the whole surface a rather rough appearance not existing in any one of the closer relatives.

Elytra feebly wider (50:47) and 1.5 times as long as the pronotum, widest at the middle, sides parallel on the basal fourth, then feebly widened in a very shallow curve, apex moderately broad and but little angulately rounded; compared with *X. mascarensis* Eichh. the declivity appears decidedly flatter, commences farther in front, and is more gradually convex; disc striate-punctate, the striae not deep but distinct, less so on the sides, the punctures shallow, deeper on the sides, somewhat irregular, interspaces wide, each with a fairly regular row of small setose punctures, less evident near the base, on the suture the punctures fewer in number, but larger and irregular in their position; declivity with 3-4 granules on the first and third interstices, the second feebly depressed, narrower with a few punctures, which appear like minute granules in a certain light, the punctures of the striae moderately large, rather shallow, somewhat irregular; in the whole, the declivity is rough, sloping down from the suture towards the sides, with sparsely placed inconspicuous hairs.

Locality: Oahu: Nuuanu, X-1919, in *Dracaena aurea,* (J. C. Bridwell).

FIG. 2. *Xyleborus lanaiensis* Perk., masc. nov., outline.

19. Xyleborus lanaiensis Perk., masc. nov.

Male.—Yellowish brown, 2.6 mm. long, 3.0 times as long as wide.

Front plano-convex, shining, with a longitudinal groove-like impression medially, some punctures on the sides. Eyes very small.

Pronotum projecting far beyond the front, outline as in figure 2, with a deep cavity behind the apex, the disc feebly convex, subshining, minutely strigosely reticulate and shallow punctures, which are coarse, irregular in size and rather remotely placed behind, denser towards the anterior cavity. Scutellum small.

Elytra distinctly narrower and hardly longer than the pronotum, cylindrical, parallel-sided, disc with a triangular depression around the scutellum, another longitudinal depression along the suture, surface uneven and rough, with rather small punctures, rows hardly distinguishable; declivity truncate, short, rather steep, apical margin acute, sides rounded above, with a shallow depression on the upper two-thirds of the convexity, a small setose tubercle just below the upper margin on the second interspace, surface shining, densely wrinkled-reticulate-granulate, especially towards the apex, more polished near the narrowly elevated suture; with scattered long hairs, especially on the declivity.

Locality: Oahu: Haleauau, 11-XI-1926, ex *Sideroxylon sandwicense.* Females are represented from the following localities:
Oahu: Haleauau, 11-XI-1926, ex *Sideroxylon sandwicense*
Oahu: Haleauau, 8-I-1933, ex *Sideroxylon sandwicense*

20. Xyleborus kauaiensis Perk.
Hawaii: Kohala Mts., Upper Hamakua Ditch Trail, 3-IX-1919, ex *Cheirodendron.*

21. Xyleborus pseudoangustatus Schedl.
Maui: Olinda, 10-X-1926, ex *Acacia koa*
Oahu: Kahauki, 28-IX-1924, ex *Acacia koa*
Maui: Mahena, 12-X-1926, ex *Acacia koa*
Oahu: Pupukea, 26-IV-1925, ex *Xylosma hawaiiense*

22. Xyleborus testaceus Walk. (*immaturus* Blackb.).
Maui: Mahena, 12-X-1926, ex *Acacia koa*
Oahu: Haleauau, 14-VIII-1927, ex *Pipturus albidus*
Oahu: Palolo, 22-II-1922, ex dead kukui (*Aleurites moluccana*)
Oahu: Manoa, 4-I-1920, ex *Straussia,* (J. C. Bridwell)
Oahu: Honolulu, 11-V-1932, ex *Araucaria brasiliana*
Hawaii: Kaiwiki, XI-1924, ex *Eucalyptus,* (L. W. Bryan)
Hawaii: Pepeekeo, 31-V-1932; Hilo, 13-VIII-1919.
Maui: Hana, 15-X-1926, ex dead sugar cane.

My suspicion that *X. immaturus* Blackb. is synonymous with *X. testaceus* Walk. has proven to be correct. E. B. Britton has compared specimens with both types and found full agreement.

23. Xyleborus confusus Eichh.

X. insularis Sharp is known to be synonymous with *X. confusus* Eichh. for a long time.
Oahu: Mt. Tantalus, 28-XI-1926, ex *Pipturus albidus*
Oahu: Manoa, 4-XII-1926, ex kukui (*Aleurites moluccana*)
Oahu: Makaleha Val., 13-XII-1919, ex kukui (*Aleurites moluccana*)
Oahu: Palolo, 22-II-1922, ex dead kukui (*Aleurites moluccana*)
Oahu: Kuliouou, 22-XII-1918, ex *Tetraplasandra* sp.
Oahu: Kuliouou, 11-XII-1927, ex kukui (*Aleurites moluccana*)
Oahu: Makiki Val., 27-XII-1924, ex kukui (*Aleurites moluccana*)
Oahu: Palolo, 11-XII-1921, ex kukui (*Aleurites moluccana*).
24. Platypus (Crossotarsus) *externedentatus* Fairm.
Oahu: Waimalu, 10-VII-1921, ex *Eleocarpus bifidus*
Oahu: Palolo, 22-II-1922, ex dead kukui (*Aleurites moluccana*)
Oahu: Makaleha Val., 13-XII-1919, ex *Maba sandwicensis*
Oahu: Moanalua, 30-XI-1930
Oahu: Honolulu, 13-V-1929, 24-I-1931, 15-IX-1932, ex avocado (*Persea gratissima*)
Oahu: Hauula Val., 17-V-1925, 3-XI-1929, ex *Eugenia malaccensis.*

Notes on Food-Plant Relations of Scolytidae and Platypodidae in the Hawaiian Islands

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(Presented at the meeting of February 1, 1940)

For the past 20 years I have kept records of the trees from which I have obtained specimens of Scolytidae, particularly on collecting trips in the forests, but also from trees in the lowlands and inhabited regions. I have been interested in the problem of determining whether the endemic species had any host preferences, or were attached to particular trees. Many records have accumulated, but since the species were not determined these records were of no avail. As the Scolytidae described and recorded in the Fauna Hawaiiensis are so meagerly represented at the Bishop Museum, no attempt had been made to identify the species involved. Finally, however, considerable of the accumulated material was sent in 1939 to the British Museum for determination, as at that Museum would be the types of all of the Hawaiian species. However, this material was turned over to Dr. Schedl in Germany for determination.

Recently, a good portion of the species have been returned as determined by Dr. Schedl, and his manuscript concerning them received for publication. Due to the war conditions in Europe it is doubtful if, or when, any more of the material will be returned. That being the case, it seems opportune to present my notes and additional records on the species determined by Dr. Schedl, which seem to be the species usually met with. Not all are endemic. Records are given also on a few species which were already known, and hence no specimens present in the material studied by Dr. Schedl.

As seen by the appended list of food-plants, the majority of the species are not specific as to their host, but are found on quite a number of trees. A few have as yet been collected from a single species of tree, but in these cases not so many collections have been made, and more collecting should be done before determining definitely whether this represents a specific host. Apparently the species which might be considered endemic are chiefly confined to endemic trees, while the immigrant forms are in the main found on introduced trees.

1. Hypothenemus insularis Perkins.

Hypothenemus insularis Perkins, Fauna Hawaiiensis, II, Part III, p. 181, 1900.

This species was described from Kauai. Most of the records are from Oahu. Besides those given by Dr. Schedl, I add the following records:* Oahu: Manoa, April 28, 1918, ex *Acacia koa*;

Kaimuki, March 5, 1922, ex *Aleurites moluccana;* Honolulu, Jan. 21, 1930, ex *Nothopanax guilfoylei;* Poamoho, Nov. 11, 1933, ex koa pods; Honolulu, May 11, 1934, ex breadfruit; Keekee Gulch, Sept. 25, 1934, ex *Osmanthus;* Kalauao, Jan. 30, 1935, ex *Indigofera;* Palikea, Feb. 3, 1935, ex *Xanthoxylum;* Manoa, Feb. 16, 1940, ex breadfruit; Kokokahi, Jan. 25, 1941, ex *Thespesia* pods. Maui: Paia, Feb. 1931, ex fennel (Van Zwaluwenburg); Wailuku, Feb. 23, ex *Ficus.*

2. Hypothenemus ruficeps Perkins.

Hypothenemus ruficeps Perkins, Fauna Hawaiiensis, II, Part III, p. 181, 1900.

Described from Oahu; also collected on Maui. Besides those given by Dr. Schedl, I add the following records: Oahu: Kaimuki, March 8, 1931, ex grass; Moanalua, April 24, 1914, ex bamboo; Ewa Plantation, March 9, 1920, ex *Datura;* Waipio, March 8, 1922, ex dead sugar cane; Honolulu, Aug. 19, 1925, ex *Cassia garatensis* (McEldowney); Honolulu, Oct. 10, 1931, ex mango grafts (H. L. Lyon); Honolulu, May 11, 1934, ex breadfruit; Kawela Bay, Dec. 16, 1934, ex grass.

3. Hypothenemus eruditus Westwood.

Tomicus (*Hypothenemus*) *eruditus* Westw. Trans. Ent. Soc. London, 1836, I, p. 34.
Hypothenemus eruditus, Sharp, Tr. Ent. Soc. London, p. 102, 1879.

Described in England from book bindings. Occurs also in Guinea, North America, Hawaii, and New Caledonia. Found by Blackburn "in bark of a species of Acacia on the plains of Oahu." It must have been *Acacia farnesiana,* or possibly algaroba. Our collections have specimens of it from dead sugar cane, Honolulu, June 29, 1907, April 23, 1908, June 26, 1918, Aug. 23, 1934, and Ewa Plantation, July 1, 1914; Waialua, Jan. 9, 1909, ex dead *Crotalaria saltiana;* Kaimuki, June 14, 1913, ex lima bean pod; Paia, Maui, Feb. 1931, ex fennel (Van Zwaluwenburg); Makapuu, April 1, 1939, ex dead twigs of *Gossypium tomentosum;* Honolulu, Feb. 14, 1940, in bark of dead branches of Croton; Kokokahi, Jan. 28, 1941, ex *Thespesia* pods. Honolulu, Jan. 21, 1930, ex *Nothopanax.*

4. Hypothenemus oahuensis Schedl.

Hypothenemus oahuensis Schedl, Proc. Haw. Ent. Soc., XI, No. 1, p. 110, 1941.

I have other records besides those given by Schedl as follows: Oahu: Makua, May 30, 1925, ex kukui; Ewa coral plain, Dec. 18, 1926, ex *Euphorbia;* Waimano, Nov. 22, 1931, ex hau.

* Unless otherwise indicated, all material was collected by O. H. Swezey.

5. Hypothenemus mauiensis Schedl.

Hypothenemus mauiensis Schedl, Proc. Haw. Ent. Soc., XI, No. 1, p. 110, 1941.

The record by Schedl is the only one yet known.

6. Hypothenemus griseus Blackburn.

Hypothenemus griseus Blkb., Tr. Dublin Soc., III, p. 194, 1885.

Described from Oahu. A single specimen taken on poppy on plains near Honolulu. Recent records are Honolulu, Sept. 19, 1931, ex mango scions (H. L. Lyon); Manoa, Feb. 12, 1940, at light (Ehrhorn).

7. Ericryphalus sylvicola (Perkins).

Hypothenemus sylvicola Perkins, Fauna Hawaiiensis, II, Part III, p. 181, 1900.

Described from Lanai and Kauai. Other records besides those given by Schedl are as follows: Oahu: Hauula, Nov. 3, 1929, ex *Pipturus;* Manoa, Dec. 28, 1930, ex *Pipturus;* Honolulu, May 11, 1934, ex breadfruit; Manoa, Feb. 16, 1940, ex breadfruit.

8. Ptilopodius pacificus Schedl.

Ptilopodius pacificus Schedl, Proc. Haw. Ent. Soc., XI, No. 1, p. 111, 1941.

Described from Oahu. Collected abundantly on hau and monkeypod in 1926, Honolulu and Manoa Valley (F. C. Hadden). No doubt a somewhat recent immigrant at that time.

9. Stephanoderes maculicollis (Sharp).

Hypothenemus maculicollis Sharp, Trans. Ent. Soc. London, 1879, Pt. I, p. 101.

Described from Oahu, and the numerous records are all from that island. Besides those given by Schedl we have the following: Oahu: without locality, ex *Acacia* (Koebele); Kaimuki, Nov. 23, 1907, ex ironwood; Honolulu, March 11, 1925, ex peach twigs; Kalihi, Dec. 11, 1926, ex mangrove; Niu, Sept. 30, 1928, ex *Psidium cattleyanum;* Manoa, Nov. 24, 1929, ex *Osteomeles;* Kalauao, Nov. 16, 1932, ex *Acacia confusa;* Makapuu, Feb. 4, 1934, ex *Gossypium tomentosum;* Koko Head, Feb. 13, 1934, ex basil; Mt. Tantalus, Oct. 28, 1934, ex *Euphorbia;* Honolulu, Oct. 27, 1935, ex *Barringtonia;* Honolulu, Oct. 16, 1937, ex *Leucaena glauca.*

10. Stephanoderes lebronneci Beeson.

Stephanoderes lebronneci Beeson, Marquesan Insects, III, B. P. Bishop Museum Bull. 142, p. 104, Fig. 3, 1935.

Described from the Marquesas Islands on guava. We have no other records in the Hawaiian islands except those on Oahu, given by Schedl.

11. Stephanoderes hawaiiensis Schedl.

Stephanoderes hawaiiensis Schedl, Proc. Haw. Ent. Soc., XI, No. 1, p. 112, 1941.

We have no other record except the one on dead cane given by Schedl.

12. Poecilips persicae (Hopkins).

Thamnurgides persicae Hopk., Report of Secy. U. S. Dept. of Agriculture, No. 99, p. 45, Pl. II, Fig. 30, 1915.

Described from imported peach trees in Honolulu, 1905 (Van Dine). Other recent records are: Manoa Valley, Dec. 28, 1930, ex *Pipturus;* Manoa, Dec. 24, 1937, ex avocado seed. A large number developed in a decaying avocado seed on the ground in my garden. Hawaii: Keopu, Kona, March 7, 1939, ex avocado (Nishimura).

13. Coccotrypes dactyliperda (Fab.).

Bostrichus dactyliperda Fab., Syst. Eleuth., II, p. 387, 1801.
Coccotrypes dactyliperda, Eichhoff, Rat. Tom., 1879, p. 309.

Described from Europe. Occurs also in Africa and Asia. First found established in California in 1926. The first record of it in Hawaii was 1928, though there were specimens in the collections bearing much earlier dates. I have reared it from date seeds on the ground, and the seeds of several other palms. Dates and host records are as follows: Oahu: Honolulu at Exp. Station, H.S.P.A., Dec. 28, 1907; Honolulu, Sept. 1907, ex palm seeds (Terry); Kaimuki, Jan. 25, 1913; Honolulu, Feb. 20, 1924, ex *Livistona rotundifolia* (Lyon); Kapiolani Park, Sept. 22, 1927, ex date seeds, Dec. 18, ex *Pritchardia pacifica;* Honolulu, Nov. 28, 1927, ex *Oreodoxa regia* and *Livistona chinensis;* Manoa, Nov. 13, 1927, ex *Livistona,* Dec. 17, 1927, ex *Washingtonia filifera;* Kamehameha School, Dec. 18, 1927, ex date; Waialua, Dec. 18, 1927, ex date. Kauai: Lihue, March 11, 1928. Hawaii: Kohala, May 13, 1931; Olaa, May 20, 1931, ex *Livistona* and *Dictyospermum album.*

14. Coccotrypes pygmaeus Eichhoff (?).

Coccotrypes pygmaeus Eichh., Rat. Tomic., p. 310, 1879.

Described from Philippines. Occurs also in Africa. First recorded in Hawaii in 1928, though it was collected considerably earlier. An undated specimen was collected on Oahu by Albert Koebele. It must have been collected sometime prior to 1902 as Koebele spent scarcely any time in Honolulu later than that. It is another palm seed weevil. I have reared it from seeds of several

palms. Dates and host records are as follows: Oahu: undated (Koebele); Pearl City, Feb. 4, 1905, ex date seed; Experiment Station, H.S.P.A., June 8, 1927, ex *Livistona chinensis* (Rosa); University of Hawaii campus, Dec. 6, 1927, ex *Sabal blackburniana, Coccothrinax argentea, Pritchardia thurstoni;* Kapiolani Park, Dec. 18, 1927, ex date seed; Punahou campus, Dec. 9, 1927, ex *Sabal palmetto,* Dec. 18, 1927, ex *Livistona chinensis;* Manoa, Dec. 17, 1927, ex *Washingtonia filifera,* Feb. 3, 1934, ex date, Sept. 20, 1934, ex almonds. Kauai: Lihue, March 11, 1928.

15. Xyleborus fornicatus Eichhoff.

Xyleborus fornicatus Eichh. Berl. Ent. Zeitschr., XII, p. 151, 1868.

Described from Ceylon in 1868, where it is injurious to tea. It is also known in India and the Dutch East Indies. It was not recorded in the Fauna Hawaiiensis, but has been known in the Hawaiian Islands since 1910, when it was collected from avocado. It was known on avocado for many years before its identity was known. Besides the records by Schedl, are the following: Oahu: Honolulu, Aug. 1910, ex avocado (Kuhns), Oct. 2, 1912, ex *Eugenia jambolana,* Sept. 24, 1927, ex *Sterculia foetida;* Kaimuki, June 25, 1914, July 6, 1926, ex avocado; Makiki Valley, Nov. 18, 1917, ex *Ricinus communis;* Mt. Tantalus, Oahu, Feb. 23, 1925, ex *Acacia koa;* Jan. 25, 1935, ex *Albizzia moluccana.* Maui: Puunene, Feb. 24, 1935, ex *Enterolobium cyclocarpum;* Lahaina, Nov. 22, 1935, ex avocado (Dunn). Molokai: Mapulehu, Dec. 1936, ex avocado (Otsuka). Hawaii: Hilo, March 1, 1919; Kukuau, Jan. 8, 1940, ex mango, citrus and *Spondias* (Maneki).

16. Xyleborus spinosulus Schedl.

Xyleborus spinosulus Schedl, Stylops, III, p. 178, 1934.

About a dozen of this species were collected from a monkeypod tree (*Samanea saman*) on Mt. Tantalus, Oahu, May 5, 1918. It was described from specimens collected from *Acacia koa,* Mt. Tantalus, Oahu, October 1925 (Hadden).

17. Xyleborus hawaiiensis Perkins.

Xyleborus hawaiiensis Perkins, Fauna Hawaiiensis, II, Part III, p. 175, 1900.

Described from Hawaii and recorded in Fauna Hawaiiensis only from that Island. Besides the record in Schedl's paper, are the following: Oahu: Kamokunui Valley, Oct. 1, 1933, ex *Pipturus albidus;* Haleauau Valley, Jan. 3, 1932, ex *Pipturus;* Mt. Olympus, Sept. 6, 1935, ex *Dubautia laxa.*

18. Xyleborus truncatus Sharp.

Xyleborus truncatus Sharp, Tr. Dublin Soc., III, p. 192, 1885.

Described from the Hawaiian islands, and recorded from Oahu, Lanai and Hawaii. A very common species on several native forest trees. Besides the records in Schedl's paper are the following: Oahu: Haleauau Valley, Dec. 1, 1929, ex *Elaeocarpus bifidus;* Feb. 9, 1930, ex *Acacia koa,* Sept. 14, 1930, ex *Elaeocarpus;* Kawailoa Ridge, Oct. 2, 1934, ex *Syzygium sandwicensis;* Kahana and Waikane, Jan. 19, 1930, ex *Pipturus* and *Bobea.* Maui: Nahiku, Aug. 20, 1929, ex *Pipturus.* Hawaii: Kilauea, July 9, 1934, ex *Pipturus.*

19. Xyleborus oahuensis var. **scabratus** Schedl.

Schedl, Proc. Haw. Ent. Soc., XI, No. 1, p. 113, 1941.

Described on material from Oahu: Pupukea, April 26, 1925, ex *Xylosma hawaiiense,* and Honolulu without date. No other records.

20. Xyleborus tantalus Schedl.

Schedl, Proc. Haw. Ent. Soc., XI, No. 1, p. 114, 1941.

Described from Oahu: Mt. Tantalus, without date, ex *Byronia sandwicensis* (Bridwell). Only one other record. Hawaii: South Kona, Aug. 11, 1919, ex *Byronia.*

21. Xyleborus nuuanus Schedl.

Schedl, Proc. Haw. Ent. Soc., XI, No. 1, p. 114, 1941.

Described from Oahu: Nuuanu, October, 1919, ex *Dracaena aurea* (Bridwell). No other records.

22. Xyleborus lanaiensis Perkins.

Perkins, Fauna Hawaiiensis, II, Part III, p. 176, 1900.

Described from Lanai and recorded in Fauna Hawaiiensis only from that Island. Recent collections were from Haleauau Valley, Oahu, Nov. 11, 1926 and Jan. 8, 1933, ex *Sideroxylon sandwicense;* Halona Valley, Oahu, March 12, 1933, ex *Sapindus oahuensis.*

23. Xyleborus kauaiensis Perkins.

Perkins, Fauna Hawaiiensis, II, Part III, p. 174, 1900.

Described from Kauai, and no other record in Fauna Hawaiiensis. Recent collections were from Hawaii: Upper Hamakua Ditch trail, Sept. 3, 1919, Oct. 4, 1929, ex *Cheirodendron platyphyllum* (Swezey and Whitten); Kilauea, July 9, 1934, ex *Cheirodendron.* Kauai: Kokee trail to Kalalau, Aug. 15, 1925, ex *Cheirodendron.*

24. Xyleborus pseudoangustatus Schedl.

Besides the records in Schedl's paper we have the following: Oahu: Manoa, Dec. 28, 1930, ex *Pipturus;* Haleauau Valley, Jan. 3, 1932, ex *Pipturus;* Kawailoa, Oct. 2, 1934, ex *Perrottetia;* Waipio Ridge, Sept. 18, 1934. Maui: Haelaau, Dec. 18, 1928, ex *Byronia.* Hawaii: Kilauea, Oct. 12, 1929, ex *Acacia koa.*

25. Xyleborus testaceus (Walker).

Bostrichus testaceus Walker, Ann. Mag. Nat. Hist. (3), 3, p. 260, 1859.
Xyleborus immaturus Blackburn, Tr. Roy. Soc. Dublin, III, p. 193, 1885.
Xyleborus testaceus Hagedorn, Junk Cat. Col., XXVI, p. 112, 1910.
Xyleborus kraatzi Eichh., Beeson, Insects of Samoa, IV, 4, p. 240, 1929.

This pale species was first described from Ceylon. It has a wide distribution under several names, from India through Malaya, Philippines, Formosa, New Guinea, Solomon Islands, Australia to Samoa and Hawaii. It was the most abundant of the scolytids we collected in Guam in 1936.

Besides numerous records in Schedl's paper, we have the following: Oahu: Helemano, Oct. 18, 1907, ex dead cane (Terry); Honolulu, July 19, 1911, ex dead petiole of date palm (Higgins); Kamehameha Schools, Jan. 22, 1917, ex redwood staves of silo (Bridwell); Manoa, Dec. 20, 1919, ex *Cordyline terminalis* (Bridwell); Nuuanu, Oct. 1919, ex *Dracaena aurea* (Bridwell); Mt. Kaala, Nov. 11, 1926, ex *Elaeocarpus bifidus;* Waikane, Jan. 19, 1930, ex *Bobea elatior;* Kailua, Oct. 9, 1930, ex dead sugar cane; Honolulu, Nov. 3, 1933, ex *Poinciana regia;* Manoa, Jan. 19, 1935, ex *Eugenia malaccensis;* Honolulu, July 17, 1935, ex *Poinciana regia* (Martin). Maui: Haelaau, Dec. 18, 1928, ex *Byronia sandwicensis.*

26. Xyleborus confusus Eichhoff.

Xyleborus confusus Eichh., Berl. Ent. Zeitschr., XI, p. 401, 1867.
Xyleborus insularis Sharp, Tr. Roy. Dublin Soc., III, p. 193, 1885.

This widely distributed species was described from South America. It is also recorded from Africa, Madagascar, Seychelles, Keeling Island, and was recorded in the Fauna Hawaiiensis from Kauai, Oahu, Maui and Hawaii. We found it in Guam in 1936. Besides the records in Schedl's paper, we have the following: Oahu: Cooke Trail, Nuuanu, April 5, 1919, ex *Perrottetia;* Mt. Tantalus, Sept. 7, 1923 (Ball); Manoa, Jan. 12, 1929 (Bryan); Waialae Iki, Jan. 20, 1929 (Bryan); Hauula, Nov. 3, 1929, ex *Aleurites* and *Eugenia malaccensis;* Manoa, Dec. 28, 1930, ex *Pipturus;* Paumalu, June 16, 1935, ex *Dracaena aurea.* Molokai: Kainalu, July 29, 1927 (Bryan).

27. Xyleborus mauensis Perkins.

Perkins, Fauna Hawaiiensis, II, Pt. III, p. 175, 1900.

Described from Haleakala, Maui, ex *Cheirodendron* (Perkins). The only other record is from Haelaau, Maui, ex *Cheirodendron*.

28. Xyleborus molokaiensis Perkins.

Perkins, Fauna Hawaiiensis, II, Pt. III, p. 174, 1900.

Described from Molokai, ex *Cheirodendron* (Perkins), and there is no other record.

29. Xyleborus frigidus Blackburn.

Blackburn, Tr. Dublin Soc., III, p. 193, 1885.

Described from Maui, ex *Acacia falcata* (Blackburn). There is no other record. Undoubtedly the host tree was the well-known koa.

PLATYPODIDAE

30. Crossotarsus externedentatus (Fairmaire).

Platypus externedentatus Fairm., Rev. Mag. Zool., p. 51, 1850.
Crossotarsus externedentatus, Chap., Monogr. Platyp., p. 81, Fig. 20, 1865.

Described from Fiji and Tahiti. Recorded in Fauna Hawaiiensis from Oahu, two specimens from *Acacia koa*. Its presence was known as early as 1885. Besides the records in Schedl's paper we have the following: Oahu: Maunawili, Nov. 17, 1903, ex avocado (Giffard); Kualoa, Jan., 1925, ex *Albizzia lebbek* (McEldowney); Honolulu, Feb. 1, 1933, ex *Cassia nodosa*, Feb. 9, 1934, ex *Cassia;* Haleauau Valley, Nov. 13, 1934, ex *Sideroxylon sandwicense;* Halawa, May 26, 1935, ex *Acacia koa.*

LIST OF SCOLYTIDS AND THEIR FOOD-PLANTS

Hypothenemus insularis Perkins. Banyan, breadfruit, croton, fennel, lima bean pod, pea vine, orange, *Hibiscus tiliaceus, Acacia farnesiana, Indigofera anil, Cajanus cajan, Crotalaria saltiana, Calotropis procera, Nothopanax guilfoylei, Bidens waianensis, Ipomoea tuberosa, Batis maritima, Samanea saman, Acacia koa* pods, *Aleurites moluccana, Thespesia populnea* pods, *Osmanthus sandwicensis, Xanthoxylum* sp.

Hypothenemus ruficeps Perkins. *Acacia koa, Cassia garatensis, Cibotium menziesii, Datura stramonium, Mangifera indica,* breadfruit, bamboo, Bermuda grass, dead sugar cane.

Hypothenemus eruditus Westwood. Bermuda grass, sugar cane, croton, *Acacia farnesiana* pods, *Gossypium tomentosum, No-*

thopanax, tennel, *Amherstia nobilis, Samanea saman, Thespesia populnea* pods.

Hypothenemus oahuensis Schedl. *Hibiscus tiliaceus, Cajanus cajan.*

Hypothenemus mauiensis Schedl. *Euphorbia hookeri integrifolia.*

Ericryphalus sylvicola (Perkins). *Cajanus cajan, Clermontia* sp., banyan, breadfruit, *Pipturus albidus.*

Ptilopodius pacificus Schedl. *Hibiscus tiliaceus, Samanea saman, Gossypium tomentosum.*

Stephanoderes griseus (Blackburn). Mango scions, poppy.

Stephanoderes perkinsi Hopkins. Orange wood.

Stephanoderes maculicollis (Sharp). *Acacia confusa, Indigofera anil, Crotalaria saltiana, Clitoria ternatea, Cajanus cajan, Leucaena glauca, Gossypium tomentosum,* basil, ironwood.

Stephanoderes lebronneci Beeson. *Cajanus cajan, Bidens waianensis, Indigofera anil, Panicum torridum,* dead sugar cane.

Stephanoderes hawaiiensis Schedl. Dead sugar cane.

Poecilips persicae (Hopkins). *Pipturus albidus,* imported peach trees, old avocado seed.

Xyleborus fornicatus Eichhoff. *Persea gratissima, Eugenia jambolana, Sterculia foetida, Ricinus communis, Schinus molle, Tamarindus indica, Albizzia lebbek, Acacia koa, Aleurites moluccana, Enterolobium cyclocarpum, Ficus altissima, Nothopanax guilfoylei.*

Xyleborus spinulosus Schedl. *Samanea saman.*

Xyleborus hawaiiensis Perkins. *Pipturus albidus, Dubautia laxa, Cheirodendron.*

Xyleborus truncatus Sharp. *Acacia koa, Syzygium sandwicensis, Straussia* sp., *Perrottetia sandwicensis, Elaeocarpus bifidus, Bobea elatior, Pipturus albidus.*

Xyleborus oahuensis var. **scabratus Schedl.** *Xylosma hawaiiense.*

Xyleborus tantalus Schedl. *Byronia sandwicensis.*

Xyleborus nuuanus Schedl. *Dracaena aurea.*

Xyleborus lanaiensis Perkins. *Sideroxylon sandwicense, Sapindus oahuensis.*

Xyleborus kauaiensis Perkins. *Cheirodendron gaudichaudii.*

Xyleborus pseudoangustatus Schedl. *Acacia koa, Xylosma hawaiiense, Perrottetia sandwicensis, Pipturus albidus, Byronia sandwicensis.*

Xyleborus testaceus (Walker). *Bobea elatior, Dracaena aurea, Straussia* sp., *Elaeocarpus bifidus, Aleurites moluccana, Pipturus albidus, Acacia koa, Eucalyptus* sp., *Araucaria brasiliana, Poinciana regia, Samanea saman,* avocado, *Byronia sandwicensis.*

Xyleborus kraatzi Eichhoff. *Poinciana regia, Phoenix dactylifera,* dead sugar cane, *Jambosa malaccensis,* avocado, Ceara rubber.

Xyleborus confusus Eichhoff. *Aleurites moluccana, Pipturus albidus, Dracaena aurea, Tetraplasandra* sp., *Bobea elatior, Pisonia sandwicensis, Perrottetia sandwicensis.*

Xyleborus molokaiensis Perkins. *Cheirodendron gaudichaudii.*

Xyleborus mauiensis Perkins. *Cheirodendron gaudichaudii.*

Xyleborus frigidus Blackburn. *Acacia koa.*

Coccotrypes dactyliperda (Fabricius). Palm seeds: *Phoenix dactylifera, Livistona chinensis, Livistona rotundifolia, Oreodoxa regia, Washingtonia filifera, Pritchardia pacifica, Oreodoxa oleracea, Dictyosperma album.*

Coccotrypes pygmaeus Eichhoff. *Phoenix dactylifera, Livistona chinensis, Sabal palmetto, Sabal blackburniana, Coccothrinax argentea, Pritchardia thurstoni, Washingtonia filifera.*

Platypus (Crossotarsus) externedentatus Fairmaire. *Acacia koa, Aleurites moluccana, Maba sandwicensis, Elaeocarpus bifidus, Eugenia malaccensis, Sideroxylon sandwicense, Cassia nodosa, Albizzia lebbek,* avocado, *Eucalyptus citriodora.*

The following species of Scolytidae have been recorded in Hawaii, but without food-plant records in literature: *Xyleborus obliquus* Sharp, *simillimus* Perkins, *oahuensis* Perkins, *dubiosus* Perkins, *rugatus* Blackburn, *frigidus* Blackburn, *agamus* Perkins, *exsectus* Perkins, *vulcanus* Perkins, *littoralis* Perkins, *ignobilis* Perkins; *Hypothenemus bradfordi* Hopkins, *Ericryphalus henshawi* Hopkins.

Some Injurious Insects in Samoa Which Do Not Occur in the Hawaiian Islands

BY O. H. SWEZEY
Experiment Station, H.S.P.A.

(Presented at the meeting of September 9, 1940)

While on an entomological survey trip in the Samoan Islands during June, July and August, 1940, Mr. Zimmerman and I noted quite a number of injurious insects which do not occur in Hawaii, some of which would no doubt prove detrimental if they should by chance become established here. The most important of these may be listed by crops or food plants as follows:*

SUGAR CANE

Perkinsiella vitiensis Kirk. Leafhopper.
Neomaskellia bergii (Sign.). Aleurodid on leaves.
Cosmopteryx dulcivora Meyr. Tiny moth whose larvae tunnel the midribs.
Melanitis leda solandra (Fab.). Butterfly whose green caterpillars feed on cane leaves. It was found on *Miscanthus* also.

COCONUT

Oryctes rhinoceros (Linn.). The large beetle which feeds in the growing top of tree.
Promecotheca reichei Baly. Hispid leafminer.
Graeffea crouani Le Guill. Walking stick insect which feeds on leaves, giving ragged appearance.
Pseudococcus cocotis (Mask.). Mealybug.
Agonoxena argaula Meyr. Small moth whose caterpillars make numerous elongate dead spots on the leaves.
Trachycentra calamias Meyr. Caterpillars feed in tops of coconut trees.

CORN

Marasmia trapezalis (Guenee).
Marasmia venilialis (Walk.). Leafrollers, the second one very abundant on grasses also.
Phytomyza spicata Mall. Dipterous leafminer.
Adoretus versutus Har. The beetles feed on the leaves, also on many other plants, similar to what *Adoretus sinicus* does in Hawaii.

* A list with more detailed notes, and illustrations, was printed in "The Hawaiian Planters' Record," XLV, No. 1, pp. 25-38, 1941.

BANANA

Nacoleia octasema (Meyr.). The scab moth. Larvae are very injurious to the growing fruits.

Cosmopolites sordidus (Germ.). Black weevil whose larvae feed in banana sprouts and stumps.

TARO

Prodenia litura (Fab.). The caterpillars often feed in hundreds on the leaves.

Hippotion celerio (Linn.). Hawkmoth whose caterpillars feed on the leaves commonly.

BEANS

Nacoleia diemenalis (Guen.). Leafroller.

Acrocercops sp. (?) Leafminer.

Azazia rubricans (Boisd.). Semilooper caterpillars on *Vigna marina.*

Jamides argentina (Prittw.). Butterfly whose larvae feed in blossoms of beach bean, *Vigna marina.*

Green pentatomid bug. A large unidentified bug.

SWEET POTATO

Herse convolvuli (Linn.). Hawkmoth whose caterpillars feed on morning-glory vines also.

Precis villida villida (Fab.). Butterfly having black spiny caterpillar feeding on sweet potato leaves.

Bedellia sp. An undetermined leafminer, different from the species in Hawaii.

Acrocercops homalacta Meyr.). A more abundant leafminer, also mining morning-glory leaves.

Ercta ornatalis (Dupon.). A pyralid, also on morning-glory.

Cassida strigula Montr. A leafbeetle, feeding also on morning-glory vines.

PUMPKIN, SQUASH, ETC.

Epilachna 28-punctata (Fab.). A leaf-feeding coccinellid, often very destructive to pumpkin vines.

Aulacophora similis Oliv. A leafbeetle, often abundant.

Greenbug. The same as on beans above.

Agromyzid. A leafminer in a wild vine resembling cucumber. Mines abundant.

TOBACCO, TOMATO, PHYSALIS

Heliothis assulta Guenee. Caterpillars abundant on tobacco leaves; also feed in green tomatoes and Physalis fruits.

GUAVA

Spilonota holotephras Meyr. A tortricid moth whose larvae feed in terminal twigs, webbing the leaves together.

Dacus psidii Froggatt. Fruitfly infesting strawberry guavas.

PAPAYA

Dacus xanthodes Broun. Fruitfly previously reared from papaya.

CACAO

Hypsipyla swezeyi Tams. A phycitid moth whose larvae feed on seeds in ripened pods.

GRASSES

Spodoptera mauritia (Boisd.). Armyworm.

Marasmia venilialis (Walk.), *Marasmia trebiusalis* (Walk.). Leaf-rollers.

Cosmopteryx mimeticus Meyr. Lepidopterous leafminer in nut-grass.

Phytomyza spicata Mall. Dipterous leafminer in Bermuda grass and several other grasses.

Sogata kirkaldyi (Muir), *S. eupompe* (Kirk.), *S. ochrias* (Kirk.), *Delphacodes dryope* (Kirk.). Leafhoppers on low coastal grasses.

HAU (*Hibiscus tiliaceus*)

Sylepta derogata (Fab.). A leafroller. Also on common hibiscus.

Cosmophila flava flava (Fab.). A green looping caterpillar. Also on common hibiscus.

Acrocercops sp. A common lepidopterous leafminer.

Mesohomotoma hibisci (Froggatt). A large green psyllid.

Chrysomelid (undetermined species). A leafbeetle whose adults and larvae feed in terminal buds.

CROTON

Aleuroplatus samoanus Laing. An abundant whitefly.

ERYTHRINA

Othreis fullonia (Clerck). A moth whose large black, prettily-marked caterpillars feed on the foliage.

Argyroploce rhynchias (Meyr.). A large tortricid moth whose larvae feed on the seeds in the pod on the tree.

CALOPHYLLUM INOPHYLLUM

Leptynoptera sulfurea Crawford. A delicate psyllid common on young leaves.

TERMINALIA CATAPPA

Thiotricha strophiacma Meyr. A minute whitish moth whose larvae feed beneath shields which they have cut from the leaf, leaving neat perforations in the blade of the leaf.

Adoretus versutus Harold. A nocturnal scarabeid beetle feeding extensively on the leaves.

COLEUS

Psara stultalis (Walk.). An abundant leafroller.

AGERATUM CONYZOIDES

Homoeosoma ephestidiella Hamps. A small gray phycitid moth whose larvae feed in the flower heads.

Spathulina acroleuca Schiner. A pretty little trypetid fly whose larvae feed on the growing seeds in flower heads.

Records of Immigrant Insects for the Year 1940

BY THE EDITOR

In this issue of the Proceedings, the following immigrant species are recorded for Hawaii. Those marked with an asterisk were observed for the first time at the date mentioned in 1940. The others were previously observed or known but not yet identified. For details of records, etc., refer in the text to the pages as given.

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